THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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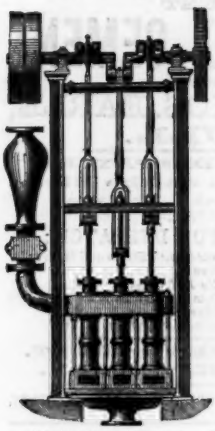

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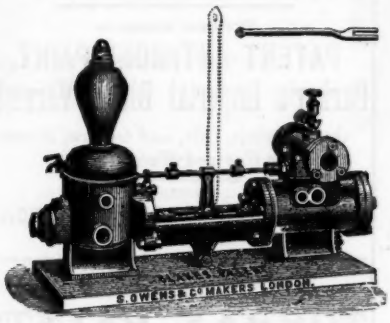

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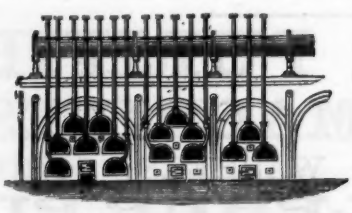

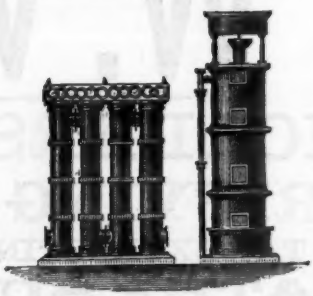

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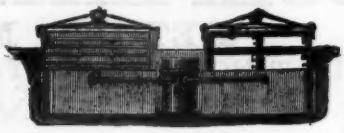

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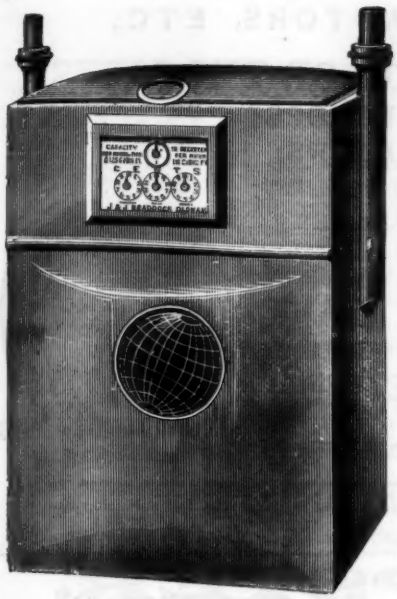

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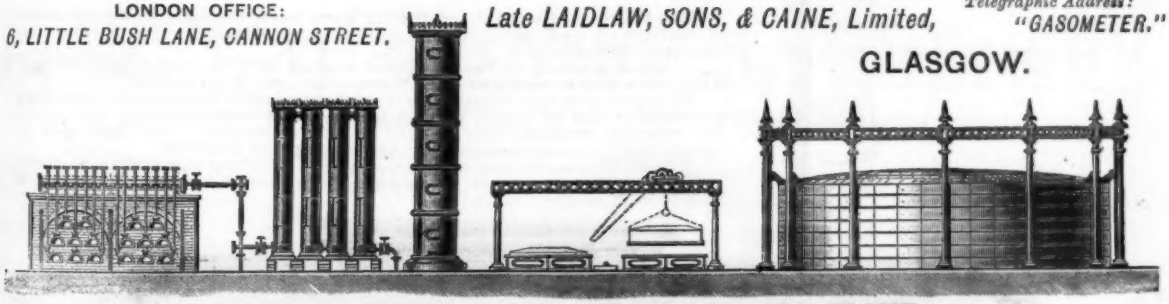

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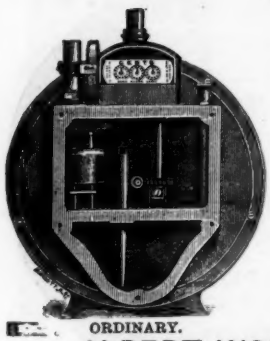

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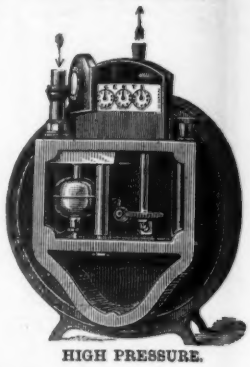

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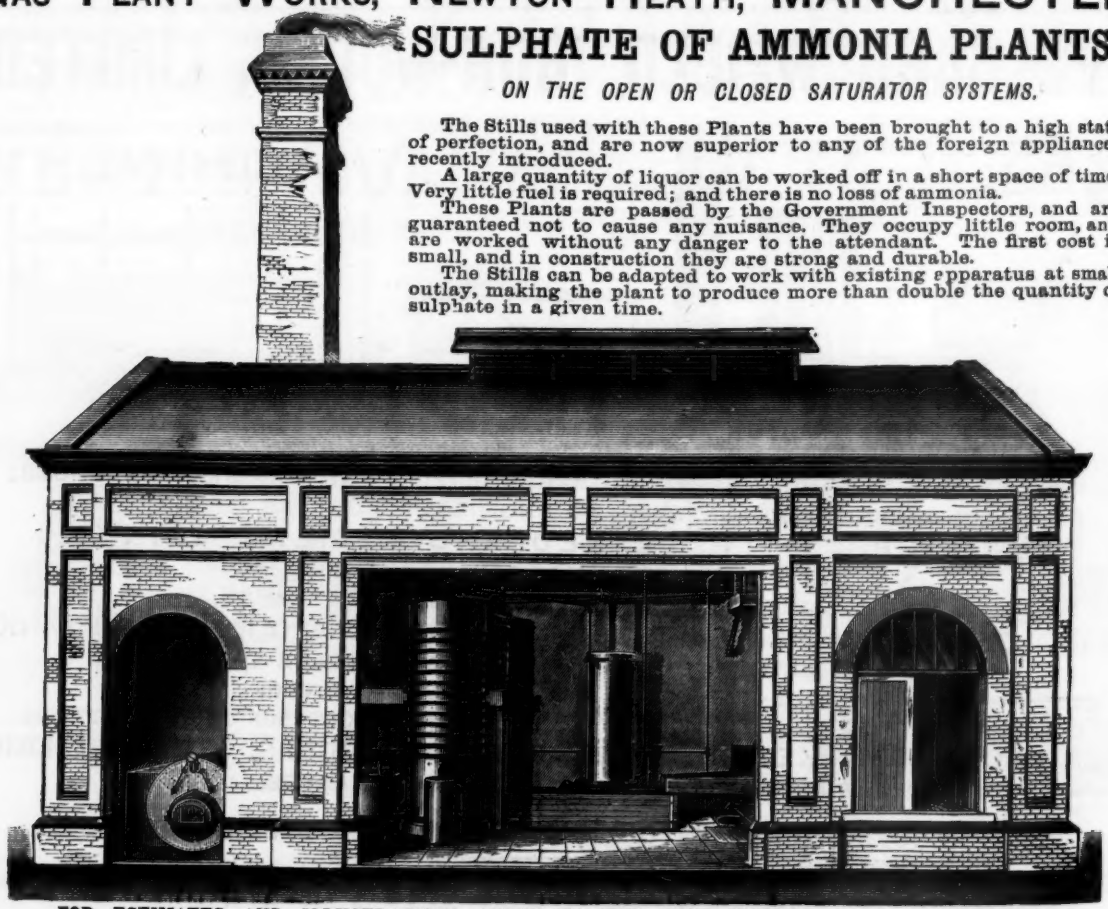

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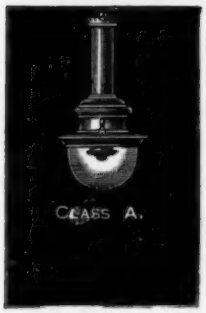

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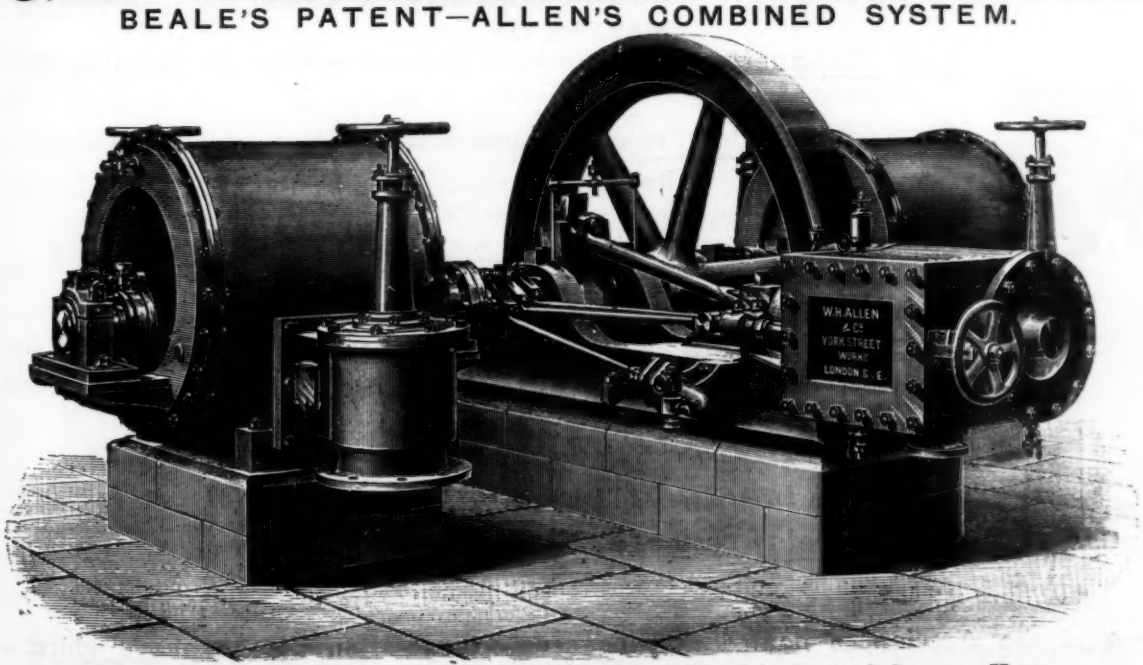

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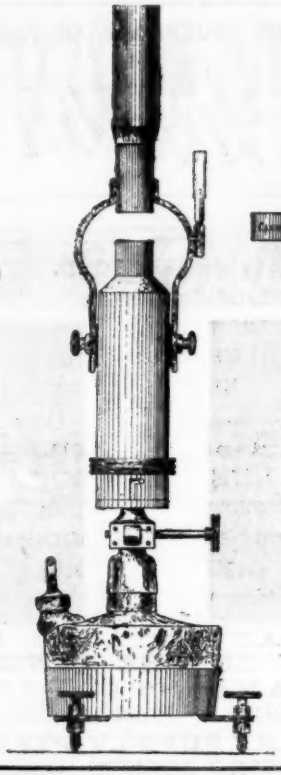

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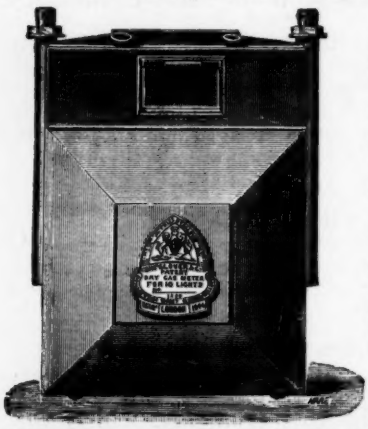

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TO CORRESPONDENTS.

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Telegraphic Address: "GASKING LONDON."

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 26, 1889.

THE RUMOURS OF COAL AND FIRE-CLAY SYNDICATES.

A good deal has been published lately with respect to what are known as "Syndicates" in commerce; and a few words upon the subject may not be out of place here. The word "Syndicate" is one that bears different meanings according to the connection in which it is employed. As used in commerce, moreover, it has several synonyms more or less expressive of its special meaning. A favourite equivalent for it is the grand word "Trust," which is itself borrowed for the purpose from the general stock of the language, and made to bear a technical significance. This is the term provided by the friends of the Syndicate system for the use of the public. It has a good sound—reassuring, comforting, not alarming in any way—which is a great advantage. Sometimes the arrangement is called a "Union." In smaller, but not always what should be therefore necessarily regarded as more select circles, the same thing is often spoken of by the less euphonic name of "swindle." Here, again, the word is employed in a strictly technical sense. It is unnecessary to state what is commonly meant by this last expression when taken in the same order of ideas as have originated its uncompromising derivatives, "swindler," and "to swindle." The speculators who join in a "little swindle," with a view to forcing up the value of something which they have in common possession, would object to the inference that they are therefore necessarily swindlers. Essentially, perhaps, there is not much morality in the operations we are now considering; but there is a good deal of respectability about them, and this is even more important with many people. Mr. W. S. Gilbert's typical pirate avowed that he did not entertain a very lofty opinion of his calling, but declared that, as compared with ordinary respectability, it was distinctly virtuous. The sting of this sarcasm is not likely to be removed by the present tendency of respectable people to copy the American example of establishing "Syndicates" for controlling the trade in a variety of commodities which offer facilities for the operation. Briefly stated, the idea of a commercial Syndicate is the union, for offensive and defensive warfare upon the rest of the community, of those who have the control of the production of any article of prime necessity. Instead of competing with each other for business, the members of such a combination bind themselves only to sell their product at an agreed price, which must necessarily be more than it realizes in the open market, or the Syndicate would have no reason for its existence. Without going into ancient history for examples of these combinations, we may cite the great "Copper Ring"—observe another synonym—which has recently broken up with such calamitous results in Paris, and the Salt Trust in this country. There are, moreover, a number of "understandings" among steel-rail makers, sheet-iron makers, wire drawers, and other traders, which shade off the crude tyranny of the Syndicate system into open market dealing. Now we are threatened with two distinct combinations of the producers of coal and fire-clay goods, which, if they could be brought about, would have the most important influence not only upon the gas industry, but also upon the general trade of the country.

It is computed that a combination of coal-owners representing something like 100 millions of capital could control the coal mines of the country; and a great meeting has been held in Manchester, at which it is reported that many adhesions to the principle of a Coal Syndicate were at once recorded. Something similar is stated of the fire-clay trade. Meanwhile the mass of consumers against whom these plots are being devised, maintain their ordinary composure, and show no sign of such alarm as would be manifested by placing heavy orders for supplies before the price can be forced up by the unnatural means in question. This apathy is either wise or foolish according to the view that may be taken of the prospects of the threatened combinations. The mere fact that it exists is "a heavy blow and sore discouragement" to the plotters, most of whom we suspect would regard the booking of a few additional orders as ample reward for their trouble in raising the cry of a "Trust." Nobody can say off-hand, of course, that such a thing as a gas-coal "ring" could not possibly be formed in the United Kingdom, or that if established it might not, while it lasted, cause some uneasiness, and even loss, among consumers. The great point is, however (as recently stated by the First Lord of the Treasury in the House of Commons), that no such arrangement was ever known to hold good for long. The history of the Copper Syndicate sheds a strong light upon this observation. Copper is obtained in few places in comparison with coal, and is much more easily controlled. Yet the attempt to establish a financial blockade of the copper mines has ruined those who were committed to it. The reason is obvious. In order to establish and maintain a binding blockade, every loophole must be stopped; and the trade must remain at the usual volume, notwithstanding advanced prices. These conditions were not secured in the case of copper; and in the matter of coal they would not be even approximately attained. A union of the owners of coal mines in regular work would have to face the fact that a forced advance of prices, to any extent worth having at the cost of their independence, would bring forward a host of abandoned seams and inferior coals to take their places in the open market. They would first find themselves in the position of Ishmaelites of commerce, and afterwards would have to purchase safety by including fresh conspirators every day until the whole thing collapsed

by its own weakness. We have no wish to see the coal industry of this country passing through any such phase of trouble and disgrace as some false friends are proposing for it under the guise of a union of interests. Fortunately, it is too big to be placed in bondage. The same kind of arguments apply to the fire-clay trade. Combination is easier, perhaps, in the latter case; but its ultimate effects would be not less disastrous for those producers who should have put themselves in the wrong with their customers and the public generally.

THE LONDON COUNTY COUNCIL ON THE GAS SUPPLY.

The motion standing in the name of Mr. James Beal for referring to the Finance Committee the consideration of the steps to be taken, if so advised, for the acquisition of the London gas and water undertakings, was discussed at last week's meeting of the London County Council. The mover of the resolution made a very temperate speech, chiefly relating to the water supply, which will be found specially reported in another column. As to the gas supply, Mr. Beal practically confessed that the case for purchase was weak. He admitted that great reductions of price had been made by the Companies; and merely asked if so much had been done without a County Council to control the supply, what ought not to be done by the Council now established? He thought, at least, that if the Council had the gas supply they might secure an additional source of revenue to be expended on improvements. On the whole, the members of the Council handled Mr. Beal's resolution very fairly. They pointed out that the questions of gas and water, although blended in the resolution, are essentially distinct. Proceeding on the same line, it was argued that while water is a necessary of life, gas is merely one of several known means of artificial lighting. It is, in short, a manufacturing business; and the Council displayed praiseworthy reluctance to meddle with anything of that kind. In all probability gas and water were merely mixed up by Mr. Beal conventionally, through the idea that they occupy nearly the same place in the economy of towns. He soon saw his error; and made the best amends in his power by withdrawing the question of gas from his motion, with the full consent of the members generally—not one voice being raised against it. Nothing could be more satisfactory than this. The Council have had the subject of the advisability of acquiring the gas undertakings of the Companies before them, and have dismissed it uncompromisingly as something that is altogether out of their province. Our satisfaction at such a wise decision is unqualified by what was said at the time about the possibility of gas being superseded by electricity. The Gas Companies may be trusted to take care of themselves, and desire nothing better than to be left alone to justify their existence in their own way. Mr. Beal has really done good service, albeit unintentionally, in eliciting the view of the Council with regard to this subject.

EXIT THE METROPOLITAN BOARD OF WORKS.

After thirty-four years of a life more or less usefully spent, the Metropolitan Board of Works was summarily extinguished on Thursday last by the action of the Local Government Board, prompted thereto by the London County Council. Thus an important administrative body, whose dealings with the gas supply of the Metropolis have influenced in no small degree the attitude of other local authorities to Gas Companies throughout the Kingdom, has now ceased to exist. We have had in these columns to comment upon, protest against, and occasionally (but rarely) to praise the acts of the Metropolitan Board of Works; but henceforth all our references to this once powerful authority must be historical. The manner of the extinction of the Board was remarkable. It was to retain its offices and powers until the end of the current month, under the Local Government Act, while its designated successor, the County Council, was getting itself into working order. Seeing how near was the day of its dissolution, it would naturally be imagined that a sense of dignity and fitness would have restrained the moribund Board from doing anything more than the most pressing duties of the hour, and especially from entering into any engagements to hamper its successor. It became evident, however, as the time drew on, that the dying Board was disposed to be troublesome and spiteful even to its last breath. Public attention was drawn to it by the wholesale retirement with pensions of all its old officers and servants who could claim such allowances. As a matter of justice as well as of policy, there was nothing to really object to in this, although the report of these pensions roused a section of the public to phrensy. It is only reasonable, however, that the Board should retire its old officials while it had the power of doing so; and the new body would also naturally prefer to set to work with "new "brooms" in place of the old instruments that had been worn out in the service of its predecessor. On the top of the agitation about the pensions came the report that the Board intended to accept tenders for the execution of a Thames tunnel at Blackwall, and for other heavy jobs, although the supervision of these works would fall within a fortnight to the new Council, who would not have command of the services of the engineering and clerical staff that planned these works and prepared the contracts. Thereupon the Chairman of the County Council remonstrated, but the Board ignored him. The President of the Local Government Board went out of his way to make representations to the Board, designed to awaken the members to a sense of the indecency of their contemplated actions; but in vain. The Board professed that the works in question were too urgent to wait even a week; ignoring the fact that they themselves had neglected them for years. Then came the blow. By what now looks like inspiration, power was given in the Local Government Act to the Local Government Board to shorten the time of probation and of grace allowed to the County Council and the Metropolitan Board. This power was exerted just in time to strike the power of sealing the proposed contracts out of the hands of the discredited Board, who were thus with one stroke "foiled" and slain, like any villain of melodrama. We cannot in sincerity frame any expression of regret for an authority whose last acts seem to justify the worst that was ever thought of it by its enemies. To the Gas Companies of the Metropolitan area it was always censorious, mean, and oppressive to the full extent of its powers. It had not the slightest notion of fairness in its dealings with the Companies. The pettifogging vestrymen who moulded its policy never took any other than the shortest and narrowest views of gas politics. They had the command of the revenues of a small kingdom for carrying out ideas suited to the horizon of a chandler's shop; and the wonder is that they did no more damage in their time. They had a great opportunity of gaining public esteem; but muddled it away. They have done some good, or they would have been sent about their business long ago; but it is very pitiable, from their point of view, that their final exit from the public stage is attended with jeers instead of cheers.

ALDERMAN RILEY'S DEFENCE.

Mr. Alderman Riley, the Ex-Chairman of the Halifax Gas Committee, has at length broken silence on the subject of the "scandal" with which his name has been so prominently associated. It will, no doubt, be said that he has selected for the publication of his manifesto the particular moment when those against whom it is directed are embarrassed by other difficulties. Whether or not this is true is of little consequence. If an accused has any conceivable privilege, it is surely that of taking the course he considers best with regard to his defence, and to make it how and when he thinks most advantageous. If Alderman Riley has thought to turn the strike at the gas-works to account, by delivering his counter-attack at this period, he is, therefore, well within his right. His case is a very simple one; and its interest chiefly centres in the skill with which he brings to a focus the diffuse and wandering accusations of his opponents. His strong point is undoubtedly that those who have played the chief part in the miserable business have never yet attempted to formulate any direct charge against him. They have dealt in vague hints and insinuations; and the Mayor has blustered and "talked big" about revelations which have never yet been made. There has been no attempt to bring the matter to an issue by stating in plain English the nature of the alleged "malpractices." Had there been enough said in unequivocal terms to justify an action for libel, Alderman Riley might have forced the fighting, and compelled his accusers to either produce the evidence on which they rely, or retire from the field. Why he has not done so, he makes abundantly clear; and though his reasons may not satisfy everybody, they are not without weight. He has not, in the first place, proceeded against the Mayor, because the utterances of that gentleman are presumed, by virtue of his office, to be privileged; so that, unless malice can be proved, no action will lie. If this is a correct view of the law, the reason is a good one, for it would be obviously ridiculous to commence an action which would be barred by a plea of privilege. As to Mr. Fox, there is a very distinct challenge to him; and twice, at least, in the course of his letter, Alderman

Riley dares him to state the nature of the malpractices which he has had any hand in committing. As Mr. Fox has an indemnity from the Corporation, will he accept the challenge? The wretched scandal has now dragged its weary length along for nine months. A Special Committee of the Corporation have been investigating it ever since the beginning of July last; and the only results as yet have been the ridiculous prosecution of Mr. Carr and a cloud of indefinite charges. It is surely time that the matter was closed in one way or another. If the "malpractices" which have been made so much of are of the sort to which Alderman Riley pleads guilty—the purchase of small quantities of tar or paint, or the occasional employment of a labourer or two in his garden—the sooner the fact is admitted, and the inquiry closed, the better. Indiscretions such as these may legally unfit the person who commits them for the position of Chairman of the Gas Committee; but they can hardly be what the Mayor has had in mind when talking of an appeal to the Lord Chancellor for a Commission of Inquiry. Somebody ought certainly to say what these more grave matters are. When the Mayor has answered the string of questions which Alderman Riley has addressed to him, considerable light may be thrown on what is now obscure. At present the balance of sympathy is rather with the accused than the accusers; and it is likely to remain so unless the tactics of the latter are altered.

THE EASTERN COUNTIES ASSOCIATION.

The young Eastern Counties Association of Gas Managers met in form for the first time last Wednesday, at Grantham, under the presidency of Mr. William Barratt, the Manager of the Grantham Gas Company. This Society of Gas Managers in a previously neglected corner of England has really begun very well. It has already a fair number of members, and we are pleased to observe that the caution we addressed to the founders of the Association last year—to avoid all superfluous formality of procedure—has been taken in good part, and acted upon by the Committee. If we understand aright the President's remark upon this head, it is not the intention of the Association to entirely depend on the reading of papers at the meetings, but to devote some time, at their periodical gatherings, to the interchange of opinions verbally expressed. We think they are wise in thus refraining from handicapping themselves with an obligation which presses very hardly upon small technical societies. At the same time, it will not do for the Secretary and Committee to regard this liberty as delivering them from the obligation to provide for the interest of the meetings by settling in advance, however informally, the technical "bill of fare" for each. Unless there is some provision in this respect, there will be danger of the members falling into the style of meeting popularly supposed to be favoured by Quakers; and a very brief experience of this sort of thing will keep men away. Mr. Barratt's Inaugural Address was a capital model for members of the young Association in matter and manner. It was unpretentious and practical; kept well within the grasp of the least advanced hearer; and if it was a little dogmatic in parts, it was all the more expressive of the individuality of the speaker, which is, after all, what is most essential in a presidential address. Mr. Barratt invited discussion on his remarks; but in regard to this point we must agree with what was said by Mr. C. E. Jones, who recommended the observance of the old rule that these orations should not be debated. It may be true enough that many Presidents would welcome criticism of their utterances; but the temporary gain that might occasionally accrue from indulgence in such a departure from rule, would be dearly bought by the sacrifice of all that is distinctive in an inaugural address. As we have repeatedly argued, a presidential address is a means whereby the man whom his fellows have honoured by placing him at their head may justify the distinction. It should therefore be a disclosure of the man himself—a presentment of his experience, reflections, and opinions. If he has made any branch of *technique* his special study, then is the time to give, for the behoof of his professional brethren, some of the results of this study. Any statements made by the President are, however, to be regarded as *obiter dicta*. He is not bound to give his reasons for them. The facts that they are his thoughts and that he is President are quite sufficient justification for most of his declarations from the chair. His hearers may take them or leave them, agree with or dispute them, just as they please; but it is obviously impossible as well as undesirable to discuss matters of opinion, or statements proffered upon individual authority. In the end, the argument would come down to a mere "I think so" on both sides—which is obviously a barren ending. It may be remarked, however, that we have had a good deal to say upon this subject which is really of a general character, and has but the slenderest connection with the particular matter of Mr. Barratt's address. This is true; but general reflections are oftener than not suggested by a special example; and if not uttered then and there, are apt to be postponed for a better opportunity, which may never come.

THE SUPREMACY OF THE METER SYSTEM.

Electricians are just finding out the practical impossibility of carrying on their business of supplying light for domestic purposes without meters; and "natural gas" companies in the United States are learning the same lesson. Thus from these two different, and in a sense opposed quarters, comes the same testimony to the soundness of the judgment of the founders of the coal gas industry, who were the first to introduce and insist upon the use of meters, frequently against the public opinion of their time. Relying upon the experience of the early Gas Companies, we have consistently maintained that electric lighting for domestic purposes could hardly be regarded as established on a sound commercial footing so long as the revenue was not based upon a reliable meter system; and now the natural gas companies have given in their adhesion to the same principle. The lesson to be drawn from the action of the latter, and particularly of the Philadelphia and Allegheny Companies, who are the pioneers in this matter, is specially important. Ever since natural gas was first utilized for industrial and domestic purposes, it has been wasted in a manner positively wicked. It has been a case of "light come, light go;" the wonderful product being flared away in the most wanton fashion. It seems to be the fate of American natural productions to be squandered before their value is half appreciated. The once apparently interminable forests have been burnt and chopped away, rendering the summers hotter and the winters colder than before the earth was stripped of its covering. The bison has been exterminated, the corn-lands are being exhausted, petroleum does not spout as once it did, and natural gas must be husbanded if it is to remain available for very many years longer. The first and most obvious step in the direction of economizing natural gas is to measure it; which, as the report indicates, is now done with mutual satisfaction as between sellers and consumers. It is stated that the Philadelphia Company can afford to distribute natural gas by meter at the net charge of 10 cents, or 5d., per 1000 cubic feet. This is the first piece of information we have been able to obtain with regard to the selling value of natural gas by measure. It appears a very low figure, bearing in mind the fact that out of this rate must be paid the cost of collection and distribution, and the dividend. The truth is that this natural gas is a very feeble fuel; and a great deal of it must be used to obtain a good result. Taking all things into consideration, it is probably near the mark to say that common coal gas at 15d. per 1000 cubic feet would be a cheaper fuel than natural gas at one-third of the money. There is no doubt that coal gas could be supplied at the figure named, for fuel purposes, in very many parts of the United Kingdom; and we are thus brought face to face with the fact that British manufacturers should have no occasion for envying the fuel advantages of their American rivals.

The Society of Arts have awarded the Swiney Prize—a silver cup and £100—to Dr. C. Meymott Tidy. The prize was founded by the late Dr. Swiney, and is given every five years, for the best work on jurisprudence published during that period. Dr. Tidy has secured it on the present occasion for his work on "Legal Medicine." The cup was executed from a design made expressly for the Society by the late Daniel Maclise, R.A.

The Editor of *Truth* has just uttered a deliverance on the subject of the water question in the Metropolis. Mr. Labouchere thinks that as the Water Companies' capital is about three times their real capital, the London County Council could replace the present system at about one-third its cost, which would be equivalent to reducing by two-thirds the rates charged to the consumers. He says: "The Water Companies have no monopoly. The proper way, therefore, to deal with the matter would be to offer the Companies to buy them out at the price of their real capital, with 10 per cent. in addition as a going concern; and in default of their accepting this, to borrow money at 3 per cent., and to provide water at a price to cover interest on outlay to all consumers who prefer to pay a reduced rate for a better article."

Water and Sanitary Affairs.

At the instance of Mr. James Beal, the County Council of London have set on foot a Special Committee "to consider "the steps to be taken as to acquiring the undertakings now "supplying London with water." The Committee are to present their report not later than June next, "in order to "permit the requisite notices to be considered, prepared, and "given in November for the ensuing session." But the Council have a stumbling-block in their way, in the shape of a clause in the Local Government Act, which distinctly withholds from a County Council the power "to promote any "Bill in Parliament, or to incur or charge any expense in "relation thereto." In order to overcome this difficulty, the Council have referred it to their Parliamentary Committee to consider whether the requisite powers cannot be obtained by some "Bill promoted this session by the Council." But this enabling Bill is as clearly barred as the other. The Council have not even so much power as will enable them to go before Parliament "on speculation," with the chance that the costs of the Bill may afterwards be legalized; for they are specifically forbidden to "incur" any expense in the promotion of a Bill, let the Bill be what it may. Considering the many projects requiring parliamentary sanction which the County Council have in view, this is rather a humiliating position. But what kind of scheme is it that the Council purpose bringing before the Legislature in respect to the water supply? The plan possesses a twofold character. The Council seek to acquire the existing undertakings, but they also wish to find out whether "new sources of supply" can be introduced; and this is a matter which the Special Committee are to take into consideration and include in their report. The "Engineers" of the Council are possibly to assist in the inquiry, though as to who these officers are is not very clear just now, considering the various important resignations which are taking place in the engineering staff of the Council. But Mr. Beal is impatient of "delay," and wants something to be done. He reckons that sixty years have been lost in regard to this matter. He starts with 1828, when, he says, "the public "began to understand that they wanted a better supply of "water." But what has been the nature of the "delay" which Mr. Beal so deeply laments? Improvement in the water supply of London has not been held in suspense during the last sixty years. In quantity, the supply has been immensely increased. In quality, the water has undergone the most marked improvement, although on this point Mr. Beal said nothing. The only "delay," if such it can be called, has reference to the fact that the water supply of London is not yet placed in the hands of a local authority. How is it to get there? Either by purchase or by competition. Concerning the latter process, the doctrine is reiterated—with no better authority than the dictum of Sir William Harcourt—that the Companies have "no monopoly "in the supply of water." Yet, so long as the Companies fulfil their obligations, we contend that Parliament is bound to let them remain unmolested.

A monopoly is not necessarily contrary to the interests of the public. In fact, no monopoly ought to be granted unless on conditions which secure those interests. The monopoly of the London Water Companies is of this nature; and it is undeniable that, under the present system, the Companies have expended enormous sums of money in the extension and improvement of their supply, while at the same time they have been subjected to close Governmental supervision. If there is to be competition, this should have been stated at the first; and in that case the Companies might never have existed at all, or, if set on foot, would have financed their undertakings in accordance with the risk. But the talk about "new sources of supply" is evidently founded on the idea of coercing the Companies. They are thus to be driven into selling their undertakings at a reduced price. The goodness of the water is now indisputable, and all that remains is a fight for possession. Supposing the County Council to obtain that which they covet, what will they do with it? Mr. Beal intimates that the Council are to do what has been done elsewhere; and having saved money out of the water-rates, forthwith to expend it on "improvements." Local taxation, in its present form, is said to have reached its limit in London. A disguised form of taxation is therefore now to be resorted to; and the water supply will help to serve that purpose. If the Council will pay a fair price, of course the Water Companies will give them possession. But no guarantee is forthcoming that the water supply will be any better for the change, or any cheaper. A very practical consideration is this: Whether the Council, in addition to all their other duties, can safely undertake so vast and momentous a concern as the water supply of London and its environs, comprehending a population exceeding 5½ millions, and growing with an enormous annual increase. In his address last Thursday, Lord Rosebery signified that the County Council entered on the question of the water supply "with a light heart." The expression recalls to memory a catastrophe brought about in our own time, and in another country, by ambition and an overweening disregard of facts. "The water question," says Lord Rosebery, with some little exaggeration, "has wrecked Governments, and may wreck "Governments again." Is Mr. Beal stronger than Lord Cross? Can he render the fair claims of the Companies acceptable to the hungry spirit of spoliation which he and his followers have managed to excite? If he cannot, he had better leave the matter alone. Or does he hope to find a fresh source of supply, the search for which is to cost "about £4000?" This source, if found, will not be near at hand; and its introduction in the shape of a competing scheme would simply throw the London Water Supply into a state of chaos, involving a large and unprofitable outlay, and the sacrifice of millions of money. Dream as they may, Lord Rosebery and his Councillors must deal with the Water Companies, and must deal fairly, or they may spare themselves the trouble.

The Directors of the Australasian Gas Association, Limited, have declared an interim dividend at the rate of 6 per cent. per annum for the half year ending Dec. 31 last.

Messrs. W. and B. Cowan have obtained the highest award—viz., "First Order of Merit, with special mention for general excellence"—for gas-meters and gauges shown at the Melbourne Exhibition.

The projectors of the proposed Fire-Brick Syndicate, to which reference has already been made several times in the Journal, have lately had a private meeting and settled preliminaries; so that there is every prospect of a definite scheme being shortly submitted to the public.

We are asked to state that the appointment of Chief Clerk to a Provincial Gas Company, which was advertised in the Journal a few weeks ago, and for which a large number of applications were received, has now been filled; the successful applicant being a gentleman who has for some time been connected with a large Corporation gas undertaking in the Manchester district.

According to a letter in the current number of the *Caterer*, the prospects of any English maker of gas-stoves doing business in Paris this year are remote. The writer says that, even allowing that the price of gas is not an insuperable obstacle to the more extended use of gas for cooking and heating purposes, there are others which bar English makers from entering into competition. He points out that the trade in gas-stoves is practically in the hands of the Paris Gas Company, who sell at low prices or lend without charge such appliances as they select; and while their goods are, he says, very inferior in character as compared with those of English make, the prejudice against articles of foreign manufacture is such as to render the chances of an outsider practically *nil*. As the Company have the business in their own hands, a monopoly has been created, against which, supported as it is by strong national prejudices, English makers will find it difficult to force their way.

The progress of liquid fuel heating in the United States is commented upon in a recent issue of *Engineering*, in an article showing how this movement, in which America was for a long time content to lag behind Russia, has received a sudden impulse from the discovery in Ohio of large quantities of oil not well suited for refining. The Standard Oil Company obtained the control of this oil; and instead of wasting money in trying to adapt it for illuminating purposes, the Company has arranged to pump it to Chicago, through a pipe-line 270 miles long, and intends to supply it as a fuel in substitution for coal and wood. The oil is sometimes gasified before combustion, but is more generally atomized by a steam-jet, and burnt in the furnace in the form of spray. In Chicago oil replaces coal for steam raising at about equal cost; but for many industrial purposes, the oil is worth more than solid fuel, on account of its cleanliness, deoxidizing property, and general convenience. Whenever the oil is burned in a furnace, the only precaution necessary to be taken is to make up an igniting fire in the furnace before turning on the fluid, or else it is likely that an explosive mixture would be formed of the vapour of the inflowing oil with the air in the furnace. The Standard Oil Company are taking every possible step for enlisting public favour for their commodity, by establishing a liquid fuel branch of their business, organized with an efficient staff of engineers and fitters, to carry out work for their customers. Coal is consequently getting into disfavour in Chicago; the absence of smoke from properly constructed oil furnaces being a great recommendation of the system.

Essays, Commentaries, and Reviews.

THE AFFAIRS OF THE GAS INSTITUTE.

As we anticipated in the course of our commentary last week upon the circular of the Council of The Gas Institute, the late President, Mr. H. Woodall, has found it necessary, for his own credit's sake, to correct that portion of this remarkable production which purported to set forth the difference of views that led to his retirement. Mr. Woodall's letter, given below, is a direct indictment of his quondam colleagues for having adopted his policy after driving him out from their company on account of it. A more serious charge could not be levelled against any body of men in the position of the Council; and it is one which the members of the Institute will insist upon their answering.

SIR,—To a man of any fancy, there can be few things more provoking than the imperturbable face of the old buffer, who stands up against you at a country fair, and takes your blows at one a penny. You flatter yourself, as you "place one" between the eyes, that you are going to knock him clean off his pins; but, the moment after, there he is again, looking as undisturbed as if you had only asked him the time of day! I am possessed with a feeling somewhat akin to this, in attempting to combat the last circular of my old colleagues on the Council of the Institute, which appears in your last issue, and which is dated March 12. It has, in one way or another, been hit again and again; but the assaults always provoke no response! These circular movements, like the finger on the dial-face of the dummy referred to, always go back upon themselves, and there stick. Circular of March 12 falls back upon circular of Dec. 31; and circular of Dec. 31, upon that of Dec. 21, and so on.

There is got up some appearance of consistency; for do not these circulars all tell the same tale—tell of a desire to hold the Institute intact, and to take the opinion of the members in general meeting on the question of winding up? Now, it appears that, although I "launched out" pretty plainly on these points in my previous letters to the JOURNAL, I have not carried conviction where it should have been most easy to convince; for those who sat with me in the Council should know that the policy which they are now submitting is not theirs, but that of the minority who retired. Not seeing whereby the trading element could be eliminated except by winding up, this minority were in favour of submitting a resolution with that object to the members in general meeting. The majority, on the other hand, being opposed to the idea of excluding traders, refused to vote in favour of the resolution to wind up; refused, in fact, to vote in favour of consulting the members upon the question. Two of the minority shortly afterwards retired in consequence of this vote; and as I could not, with any self-respect, appear to countenance a policy with which I totally disagreed, I retired also. Under these circumstances, I trust I may be excused for saying that I regard it as nothing less than effrontery on the part of those remaining on the Council to appropriate our policy without a word of explanation, and call it theirs; to eat their own words, in fact, and pride themselves for doing it manfully. Since Falstaff hacked his sword, and said it was in fight, I have known nothing so bravely done.

Of course, we of the minority cannot but be pleased to find that our counsel has prevailed; but it will always be a matter for deep regret that a more ingenuous spirit did not actuate our friends at the time, for then our professional brethren would have been kept in unity, and we should not have to deplore secessions, which at the present time may practically be numbered at one hundred and fifty.

For my own part, I have always been in sympathy with the desire to keep the Institute intact. But is the attempt worth making now? I venture to say it is not. In one way or another, the members have spoken in favour of the exclusion of traders. But by what process are they to be excluded? The voting power necessary to this end is broken up and lost. And supposing the end accomplished, what remains? A body that might have been whole and powerful, dismembered, discredited, and weak!

HENRY WOODALL.

Llandudno, March 22, 1889.

A meeting of the new Provisional Committee will be held on Saturday, at the Hôtel Métropole, when, if Mr. Garnett or anybody else wishes to save the old Institute "intact," it will be advisable for him to attend and explain how this is to be done. At present, as we have repeatedly pointed out, nobody on the Provisional Committee is engaged to anything against The Gas Institute or in favour of a new organization. After Saturday, however, the aim of the new movement will be much more definite. The question of the possibility of rehabilitating the Institute, for example, will have been discussed and settled one way or another. Seeing that not the faintest effort has been made in any quarter to show that the Institute can be reconstituted and its representative character restored, we shall not be assuming too much by supposing that the chief result of Saturday's work will be the definite beginning of a new organization. A resolution to this effect will be proposed, which will give the opportunity for discussing the whole subject. The widest and freest debate will be in order, provided only that it is honestly intentioned. If, as we fully expect, the result of the discussion is to establish the desirability of a new association, constructed upon lines that will necessarily appear from what is said upon the general question, it will follow that an Executive Committee will be required to take the necessary steps for carrying out the intention of the meeting. We take it that this Sub-Committee will have to inquire into the matters of establishment and constitution, and will draft rules to be submitted to a second meeting of the Provisional Committee which, by accepting them, will inaugurate the new society. It is to be hoped that there will be a full attendance and ample discussion at Saturday's meeting, for the occasion is very important.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(FOR STOCK AND SHARE LIST, see p. 588.)

THE depressing tendency which has lately influenced nearly all markets on the Stock Exchange, continued to exercise its force last week until almost the close, when a reaction set in and there was a decided improvement. However, it is almost too much to hope that there will be no further relapse, having regard to the unsettled state of the French financial difficulty. The Money Market is rather easier. The Gas department has shown fair average activity; and, with the exception of one or two special cases, general firmness is the rule. Transactions in Gaslight "A" have been remarkably steady; the price of 256½ being marked nearly every day. There has also been fair business in debenture stocks, the 10 per cent. preferences, and "H" maximum; the prices for the last two being particularly good. In South Metropolitans there was a sudden outburst of activity in "B" on Tuesday, when the top price was very nearly attained; but no business in either issue was marked on any other day of the week. Nothing at all has been done in Commercials. There is no stock in the market; nor is any likely to come in until after the general meeting next week. In Suburbans and Provincials, Alliance and Dublin old are ½ higher, the quotation touching 20 the first time for a twelvemonth. The new shares have been marked at top price; but the quotation remains unchanged. Business has been done in British, at moderate figures; but other undertakings have been stagnant. Among the Foreign companies, the most noticeable feature is the relapse of Continental Union £14 paid—marking the considerable fall of 2, with business done at 33. Buenos Ayres has also lost the advance of ½ which it made the week before. Imperial Continental has been moderately dealt in, and shows a disposition towards firmness. Monte Video has been extremely active throughout the week, at about average prices. Business in Water has been quite up to the average level; but movements have been somewhat irregular. A slight reaction in East London on realizations has lowered the quotation by 1; and Lambeth 10 per cents. show a fall of 1½. New River debentures, however, are 2 higher; and Southwark ordinary have advanced 1 more.

The daily operations were: Very moderate business in Gas on Monday, and nothing moved. In Water, nothing was touched except Southwark ordinary, which advanced 1. Tuesday's Gas business was largely in South Metropolitan "B," at good figures. Several Gaslight issues were smally dealt in, at fair prices. Water was very brisk, at old quotations. Wednesday's Gas transactions were all among the smaller issues; the big things being quite untouched. The only Water shares dealt in were Lambeth Tens, which were weak and fell 1½. On Thursday, Gas transactions were quite limited, though Monte Video continued active. Alliance and Dublin old rose ½; but Buenos Ayres fell ½, and Continental Union £14 paid had the large drop of 2. Water offered nothing to note, except a rise of 2 in New River debenture. Gas was moderately dealt in on Friday, at average figures, without change. Water was pretty active, and prices were fair generally; though East London fell 1. Saturday's business was about the average. Gaslight 10 per cent. preference was done at 264½, and Imperial Continental at 211 (the best of the week); but other transactions were not remarkable. Water was brisk; quotations remaining unchanged.

ELECTRIC LIGHTING MEMORANDA.

PROFESSOR G. FORBES ON FOREIGN CENTRAL STATION LIGHTING—THE PROSPECTS OF ELECTRIC LIGHTING—THE EDISON LIGHTING STATION IN BERLIN—PROFESSOR S. P. THOMPSON ON ARC LAMPS.

PROFESSOR G. FORBES has been lecturing before the Institution of Electrical Engineers on the lessons respecting central station electric lighting that may be drawn from foreign examples. Among others, he mentioned the station that has been started at Rome by the Anglo-Romano Gas Company as the finest example of an alternating current station that he had seen. He admitted in the next breath, however, that "it has been very costly to establish." Why the Gas Company should have gone out of their way to give electricians such a lesson is beyond our powers of conception. They went to Messrs. Ganz, of Buda Pesth, for the whole plant. There are reported to be 9000 incandescent and 200 arc lamps supplied from this station; some at a distance of three miles, and all, apparently, served by underground cables. No expense seems to have been spared in the fitting up of the plant. The switch board, for example, Professor Forbes describes as "very ingenious but very expensive;" its chief office being to enable any number of dynamos to be put in any circuit instantaneously. It was no part of Professor Forbes's task to show that this elaborate electric lighting station pays in a commercial sense. His lecture was full of valuable information gathered from American and Continental examples, which, as he complained, are too much neglected by English electricians. Among other hints, he stated that to charge a rental for electric lamps instead of employing meters, is a fatal mistake. The difficulty, of course, is to find the best meter. Professor Forbes has one of his own; but he seems to think more highly of it than anybody else, since it does not come into use very rapidly.

Now that the schemes of various electrical companies who are proposing to carve out London between themselves are under the consideration of the authorities, it is interesting to see what is thought in America of the underground conductors which have been tried there in obedience to public demand. The very existence of the later brood of English electric light companies, who propose to work under the amended Electric Lighting Act, depends upon their success with underground conductors, which have

not yet been tried to any noteworthy extent in this country, but will be insisted upon by the Board of Trade. A Committee of the National Electric Light Association of America was appointed last year to collect returns relating to this subject; and their report was submitted to the recent Chicago meeting of the Association. They state that "in only one instance have the experiments or practical workings proved satisfactory." The objections to underground wires are commercial, electrical, and mechanical. They cost in the first place eight times as much as an overhead system, and repairs and connections are very costly. It is practically impossible to secure good insulation in underground wires carrying heavy currents; the most expensive only lasting three years. The consensus of opinion is that nothing short of subways under the streets, made large enough for men to have access to the cables at any time—in short, an overhead system put out of the way of danger underground—will prove satisfactory to suppliers or consumers. This is a bad outlook for the London companies who are so light-heartedly preparing to accept statutory responsibilities in connection with underground mains such as no American company has attempted to bear.

Our contemporary, the *Electrical Review*, is at present very jubilant over the prospects of electric lighting in the United Kingdom, chiefly, as it appears, because Lord Thurlow made a sanguine speech at the recent general meeting of the Brush Company, and claimed that all electrical supply companies are doing good business. It is suggested, however, in view of the anticipated rush of the authorities of British towns after electric lighting that "so far as the public lighting is concerned, they will profit by the experience of others and avoid incandescent lamps." We wish that our hopeful contemporary would undertake to answer our remarks on this subject published a fortnight ago. It is easy to indulge in vague prophetic allusions to a future when "electric light will seriously compete, even in price, with gas at present rates;" but what we want to learn is the grounds upon which any form of electric lighting may be regarded as equal to gas for street lighting. Our contemporary gives up the case of incandescent lamps, and corrects us with regard to our idea of Mr. W. H. Preece's preference; but we want to know if it is not a fact that in every recent case in which tenders for arc lighting for streets have been invited by a local authority, the price has turned out to be greatly in excess of the cost of gas? Highway authorities are escaping from the glamour which talk of 2000-candle lamps once cast over them; and they now see that arc lamps at furlong spaces are not to be compared in lighting effect to gas-lamps at reasonably short intervals. We claim that experience shows that arc lighting that is not irritatingly "spotty" in effect is extravagantly brilliant as well as costly for ordinary roads. It would be more to the purpose to offer proof to the contrary instead of vapouring about the future.

The most extensive electric lighting undertaking in Europe is reported by Professor Forbes to be that in Berlin, where the Edison system is in use for supplying 36,000 lamps of 16-candle power and 144 arc lamps. The conductors are all underground; and, although composed of stranded cables covered with bitumenized jute, enclosed in lead, then covered with tape and preservative compound, and finally armour-plated with two crossed spirals of iron ribbon, they do not last over three years. This corroborates the American experience already mentioned, and must be regarded as one of the "rocks ahead" for electrical speculators. These Berlin cables cost £90,000 for the lamps in circuit; and if they come to be renewed every three years, it is difficult to see how the light can ever be cheap. The supply is by meter; the Aron instrument being universally employed. The charge to consumers is 6s. per lamp per annum, and 9s. 6d. per Board of Trade unit, which makes the lighting come to between two and three times the local price of gas—4s. 10d. per 1000 cubic feet. The Company is reported to be paying 5 per cent. dividend.

A mass of valuable information respecting the construction of arc lamps is contained in Professor Silvanus P. Thompson's paper on this subject, recently read before the Society of Arts. The author dissected all the arc lamps known to be capable of showing a good light, as well as some others of which so much cannot be said, and arranged them in classes according to their details of construction. An amazing amount of ingenuity has been devoted to this kind of lamp, much of it doubtless with the object of circumventing prior patents. It is not easy to classify arc lamps intelligibly. Professor Thompson roughly divides them into rack-train lamps, which he says have a distinctively clock-work look; clutch lamps, which are built like sewing-machines with a typical American mixture of finished and merely painted members; and clutch-wheel lamps, mostly favoured by British inventors, which look as if they were designed and turned out by trained engineers. This clock-work lamp is the favourite continental type; the sewing machine lamp is the American; and the engineers' lamp is the English favourite. These distinctions are picturesque, and appear fairly justified—at all events, Mr. Preece does not object to it; and therefore it may be regarded as worthy of the hall-mark.

Projected Scheme of Water Supply for Vienna.—*The Times* Vienna Correspondent says that Mr. John Aird, M.P., has recently been in Vienna, investigating a scheme by which it is proposed to improve the water supply of the city. At present the town itself is fairly supplied with good water; but the suburbs, which contain a large population, live under a chronic state of stint, which, besides being prejudicial to the public health, does great damage to the commercial development of Vienna.

THE DARKNESS OF TOWN AIR.

It appears from data first, we believe, published in Newbigging's "Handbook," that the average consumption of gas works out to more per head of the population in London and the largest cities of the United Kingdom than in the smaller towns, and more in these latter than in semi-rural districts. Doubtless many causes combine to produce these results. The necessities of the largest centres of population entail more night work than is called for in towns of moderate size. The vast bulk of goods to be handled in every centre of commerce and industry, the distances to be traversed in the every-day work of collecting and distributing the necessaries of life, the magnifying of everything (except the length of the days) to suit the size of the great city, all tend to increase the proportion of night work, to say nothing about the effect of town amusements, dissipations, crime, and misery upon the demand for artificial light. The smaller the town the less necessity there is for night work; and the habit of "keeping late hours" is less patent. All this is obvious enough as a reason why large cities require more gas per head of the population than small towns. We cannot pretend to state and discuss all the other reasons that may exist for the observed effect; but there is one, purely physical in its nature, that has not been much studied. It lies in the fact that the air of towns is always thicker, and the towns consequently darker, the larger they are. The amount and intensity of the sunlight received by towns in the United Kingdom is in inverse ratio to their size. The sun shines more rarely, and his light is feebler, in town than in the country; and one result of this factor in town life is to increase the demand for gas. The fact is patent to individual experience. Any resident in London who has been shut up between the town and the scarcely less densely populated suburbs for some months, when he makes his escape into the country is almost blinded at first by the clearness of the air, the "high lights" of the landscape, and the penetrating brilliancy of the sun. It needs such an experience to show the gloom amid which so many millions of people are compelled to live. So far as we are aware, although the effect in question has long been recognized, no systematic attempt has been made to exhibit the darkness of towns by regular recorded observations directed to this purpose. But something in this line has now been done by Mr. W. Hargreaves Raffles, who recently communicated an article upon "The Darkness of London Air" to our contemporary *Nature*.

Mr. Raffles recognizes that London fogs have attracted a considerable amount of attention, scientific and otherwise, with the result that something has been settled respecting their nature, origin, and effects. His paper seems to be mainly directed, however, to the demonstration of the fact that London air is always darker than it ought to be; and that fogs, whether black or yellow, are only exaggerations of a constantly existing thickness of the atmosphere. In the first place Mr. Raffles refers to observations made upon the air of North Western London, from Primrose Hill as a centre. With a view to record the varying transparency of the air of this locality from day to day, Mr. Raffles selected four lines of observation from the top of Primrose Hill, which, be it observed, is a lump of clay rising to the height of 219 feet above the sea level. It stands to the north west of the open clay lands of Regent's Park; and if there is fog or mist anywhere, it is generally to be found here. From this observatory, Mr. Raffles last winter made daily surveys of a number of church towers and prominent buildings in the different lines of sight chosen; noting all that were visible. The nearest objects were a quarter of a mile from the observer, and the rest were at various known distances up to 3¼ miles, which is the distance from Primrose Hill to St. Paul's. It is remarked that the winter of 1887-8 was very free from dense fogs, a consequence of the slight rainfall and dryness of the valley of the Thames. Yet during the 152 days which make up the five months selected, nothing 2 miles off and upwards was once visible. Says Mr. Raffles upon this point: "When it is known that on any ordinary fine day during the late spring, summer, and early autumn, you can see right across London on any one of these selected lines, it will be easy to realize how thick the air over London is during the winter." On nine days it was impossible to see 100 yards, and on four days you could not see 5 yards. The bare recital of these facts makes one ponder as to what may be the effect of such a gloomy atmosphere upon the people condemned to live in it. The observations might be paralleled in the South of London. From the nearest southern hills it is also possible during fine days in summer to see right across London. The Crystal Palace on Sydenham Hill, and the Alexandra Palace on Muswell Hill might exchange heliographic signals; but during six months of the year the range of view over London is less than a mile. All this is due to domestic coal fires.

Having noted the perpetual though varying darkness of London air, Mr. Raffles's next care was to ascertain for different districts the extent to which artificial light was used to make up for the deficient sunlight. Tables were drawn up to facilitate the jotting down of the times when gas was lighted by day, and supplied to observers living in seven different localities, ranging from Oakley Square, N.W., to Southwark Street, S.E., and from Homerton, E., to Notting Hill Gate, W. The result goes to show that from November, 1887, to March, 1888, both inclusive, the dweller in Homerton was fain to supplement daylight with gas during 118 hours, while even in the West End gas was required for 36½ hours at an unnatural time of day. These observations are presented in tabular form in Mr. Raffles's paper, and the data relating to

London are supported by similar records from Leeds, Liverpool, and Manchester. Leeds was the worst off, requiring gas for 81½ hours of what should have been daylight; Manchester came next with 76 hours; and Liverpool was comparatively bright during this winter, with gas burning for only 44¾ hours. It may be deduced from these figures that atmospheric dinginess or otherwise of a town is to be reckoned with, as a hitherto neglected factor of the general problem of its capacity for consuming gas.

With regard to the distribution of the darkest periods according to the calendar, it is stated that, for last winter at least, January was the worst month for darkness. November came second; and there was little choice as between December and March. February appears to have been singularly clear. London is run hard in the matter of dark fogs by the largest provincial centres. It is said that Manchester, of late years, has been unusually free from dark fogs, owing to the centrifugal tendencies of the millowners, who have moved their factories in many instances into the suburbs "to escape the heavy town rates, &c." And this is reported of a place where the ratepayers are spared in every possible way at the expense of the gas consumers! The ordinary white fog is also reported to be reduced in this vicinity through the drainage of much of the wet morass land on the western side of Manchester. If this is true, Mr. Raffles suggests that a similar effect might follow from the drainage of the marshes to the East of London, where many of the fogs that drift into the city with light easterly winds may be considered to originate. Finally, having briefly referred to the recognized effects of fogs upon the death rate of London, Mr. Raffles quotes figures supplied by The Gaslight and Coke Company to show the money cost of the extra artificial light necessitated by fogs. He makes the suggestion—not by any means a novel one, by the way—that legislation is wanted to extend the Smoke Prevention Acts so as to embrace domestic chimneys.

This declaration of opinion of course raises the whole question of the proper means to be adopted for abating the smoke nuisance in London and large towns in general. As we have repeatedly pointed out, it is idle to invoke legislation until it can be shown to be practical; and for all that can yet be advanced to the contrary, it is more reasonable to regard the darkness of town air as irremediable by any mere ordinance. One observation may be pertinently made upon Mr. Raffles's statements. Regarded from the narrow standpoint of immediate self-interest, his figures may be held to prove that the darkness of any town is something for which a gas company should be thankful, as being good for trade. Upon this showing it might be argued that the gas company would be foolish to strive by popularizing the use of gas for cooking, heating, and the production of motive power, and by pushing the sale of coke prepared for household use, to reduce the smokiness of atmosphere to which this quality of darkness is traceable. A very little reflection will show the error of any such argument. If gas and coke were generally used, as they might be, in substitution for smoky household fires, the revenue derivable from this trade would be vastly in excess of that procured from the sale of gas required to aid daylight in the darkest town. Obvious as this truth appears when stated, it has evidently escaped Mr. Raffles, and may be equally overlooked by some of the sanitary reformers who will be sure to quote him at some future time. It cannot be too frequently and strongly laid down that, so far from gas manufacturers having any real interest in the darkening of the air of towns by fog and smoke, their desire is all the other way, for the simple reason that the best smokeless fuels are of their production.

Interesting as Mr. Raffles's observations are, they only cover a single winter, and may therefore be regarded as only partial proofs of the writer's contention. It would have been well, also, if he had done something to collate his returns with data respecting the temperatures at the times mentioned. Gas manufacturers know that cold has a great deal to do with causing people to light up their gas-burners during hours when these would otherwise be out of use; but this consideration has apparently escaped Mr. Raffles. So far as his studies have extended, however, they undoubtedly contribute a useful addition to the previously available stock of information at the command of advocates of smoke prevention.

THE RELATION OF WATER SUPPLY AND DISEASE.

We closed the last article on this subject (*ante*, p. 430) by quoting the conclusion arrived at by the Rivers Pollution (1868) Commission in regard to the supposed self-purification of rivers. Singularly enough, just after that article was put in type, Dr. Robson Roose's much-discussed paper, noticed in our article on "Water and Sanitary Affairs" last week, appeared in the *Fortnightly Review*. In that paper the writer appears to question the sufficiency of the grounds upon which the efficacy of the self-purifying process has been, and still is, denied. From a sanitary point of view, the matter is of the first importance, and it would be lamentable if any misapprehension were fostered in the public mind by Dr. Roose's article. The author is doubtless eminent in his profession; but we are not aware that he can be regarded as, nor indeed that he would claim to style himself, a specialist in respect to water supply. Yet, calling in aid, a qualified opinion expressed by Dr. Meymott Tidy some years ago, he appears to favour the theory that a rapidly flowing stream will effectually get rid of its impurities by means of oxidation "or other agencies." Let us see how far this belief is justified. There may, of course, be some ground for entertaining it; but is there ground sufficiently solid and firm to induce us to accept it as affordiag ready-made remedy for Thames pollution?

Dr. Percy Frankland, whose view his *confrère* appears inclined to controvert, has not, so far as we know, laid it down that a river cannot do anything towards cleansing itself from impurities; but he, in common with several other experienced scientists, holds that natural action of the kind referred to can produce but infinitesimal results. As one instance of the truth of this belief, Dr. Frankland has pointed to the case of the River Irwell, which, after passing Manchester, runs eleven miles to its junction with the Mersey without further material pollution, and falls over six weirs. Yet the purifying effects of oxidation in this instance are admittedly trifling. Against this is set the result of tests applied to the Tees water, samples of which were on one occasion reported on favourably by Dr. Frankland. There may be special circumstances involved in this apparent inconsistency, which a more complete knowledge of the facts in each case would serve to remove. Upon the other example quoted by Dr. Roose, we do not consider that much reliance can be placed. Samples were taken from the spray caused by jets of polluted river water forced into the air for the purpose. The quality of the water thus collected proved to be much better than the analysts had expected. But, for practical purposes, this does not go far towards settling the point at issue. It is necessary to have regard to the ordinary and every-day conditions under which streams are contaminated by sewage and other offensive matter, and afterwards resorted to as sources of potable water. Let it be conceded, if desired, that the late Dr. Parkes—an authority to whose opinion great weight must be accorded—was right in holding that oxidation could accomplish "much" as a purifier. The practical question is, How much? Until we know more definitely the effect produced, it is obviously impossible to say that oxidation will make the water-drinker safe from serious risks. Upon this point Dr. Tidy has given a rough-and-ready estimate, to which, we apprehend, he would be unwilling to be very closely bound. His suggestion, as quoted by Dr. Roose, is that if sewage be discharged into a river and mixed with at least twenty times its volume of pure water, after a moderately rapid flow of a few miles the whole of the impurities will disappear, and as a result of oxidation and other agencies, the water will be restored to its original state of purity.

Here, then, we get a scientific opinion, in general terms, as to the respective measures of the poison and the antidote. A gallon of sewage-fouled water, we are to understand, may be rendered innocuous by mixture with 20 gallons of pure water. That this attributes only very partial efficacy to oxidation is, of course, obvious. If there are only 19 gallons of pure water to one that has undergone contamination, the champions of oxidation will admit that risk arises. Surely the water-drinking public will find scant comfort in such a theory. But let us confine ourselves to the question of London and the Thames; and here it is curious to notice the state of things which Dr. Roose describes as existing. It may be assumed, he says, that from 400 to 500 million gallons of water pass daily over Teddington Lock, and that 20 million gallons of dilute sewage have been mixed with it. So that if the quantity passing over the Lock approximates to 500 million gallons, Londoners, according to Dr. Tidy's calculation, may consider themselves safe. If, on the other hand, the quantity of pure water so passing is nearer 400 million gallons, oxidation "and other agencies" will *not* effectually cleanse the main source of the Metropolitan Water Supply. We fear, therefore, that the outcome of Dr. Roose's own quotations is very far from reassuring.

In the doubt and difficulty thus occasioned by the more or less conflicting opinions of experts, the public can but turn to recorded results of careful inquiry. Hence our reference to the conclusion arrived at by the River Pollution Commission of 1868, to which we cannot think that Dr. Roose has paid sufficient attention. The Commissioners duly considered Dr. Tidy's theory as now quoted by Dr. Roose; but they did not discover any proof that the organic matter contained in sewage and other polluting liquids is rapidly oxidized during the flow of the river into which such liquids are discharged. They practically and carefully tested the water of the Mersey, Ribble, Darwen, and other streams, to say nothing of the Thames itself, with results that are systematically set forth in their laboriously-compiled report. We commend that report, and the results of the analyses which it embodies, to the notice of Dr. Roose and those who may be too readily influenced by the theory to which he has lent his support. Having considered both sides of the question, every one may judge for himself as to the virtue of oxidation, in face of the deliberate opinion of the Royal Commissioners—an opinion which, in view of the article in the *Fortnightly Review*, we will venture to repeat—that there is no river in the United Kingdom long enough to effect the destruction of sewage by oxidation.

A New Sensitive-Flame Burner.—We have received from Messrs. T. Fletcher and Co., a sample of a new burner just devised by them for the production of a sensitive flame from an ordinary gas supply. The appliance consists of a special adjustment of their smallest Argand Bunsen burner, whereby a flame is produced which, when turned low, is claimed to possess the unique property of being incapable of existing in the presence of loud or sudden noise. The production of sensitive flames by special apparatus is, of course, not uncommon; but this is believed to be the first instance of an atmospheric burner being adapted to illustrate the phenomenon.

Communicated Articles.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

XII.

The most elaborate set of investigations into the composition of coal gas, was that undertaken by Dr. Percy Frankland, who read some interesting papers on this subject before the Chemical Society, and the Society of Chemical Industry, in 1873. The principal results are embodied in the following table; and he endeavours to supply an undoubted defect in previous analyses by adding the reputed illuminating values of the sample. This is but a partial remedy; and it is to be regretted that investigators have not taken the trouble to examine photometrically the samples of gas that they operated upon.

Composition of Coal and Cannel Gases, 1882-1884. (*See* Journal, *Vol.* XLIV, *p.* 18.)

——	Reputed Illuminating Power. Candles.	Illuminants C_n H_m	Carbonic Acid CO_2	Oxygen O	Nitrogen N	Hydrogen H	Carbonic Oxide CO	Marsh Gas CH_4
Edinburgh	30 ?	12·23	0·35	1·00	3·64	33·24	6·61	42·93
Glasgow	27	10·00	0·29	0·06	3·07	39·18	7·14	40·26
St. Andrews	27	10·04	2·73	0·48	2·83	36·63	5·16	42·13
Liverpool	21½	7·90	1·70	0·19	6·10	36·44	3·39	44·28
Preston	20	6·22	0·84	0·25	4·79	43·95	4·62	39·33
Nottingham	18½	5·63	0·81	0·24	2·51	45·52	5·63	39·66
Leeds	18	7·28	0·34	0·07	4·32	40·23	5·02	42·74
Sheffield	18	6·28	0·24	0·10	2·56	43·05	4·72	43·05
Birmingham	17½	4·76	1·50	0·36	10·10	40·23	4·05	39·00
Bristol	17	4·58	—	0·27	5·11	44·57	4·77	40·70
London—								
Chartered Company	16	4·41	—	0·26	5·95	47·99	3·75	37·64
South Metropolitan Company	16	2·92	0·09	—	3·19	53·14	4·11	36·55
Redhill	16	4·40	0·74	0·49	3·37	48·18	3·41	39·41
Gloucester	16 ?	4·95	0·03	0·51	2·73	48·89	4·64	38·25
Newcastle-on-Tyne	16	3·62	0·28	0·23	5·29	50·50	3·37	36·71
Newcastle-under-Lyme	15	4·53	0·08	0·11	6·22	46·31	3·74	39·01
Brighton	14	3·76	0·03	0·23	2·07	51·62	4·14	38·15
Southampton	14	3·09	0·07	0·39	2·53	53·59	3·59	36·74
Ipswich	14	4·53	0·06	0·12	10·84	43·26	2·46	38·73
Norwich	14 ?	3·26	0·27	0·14	3·03	53·79	3·40	36·11

We have next to consider the effect of each of these constituents on the value of the gas; and in doing so may follow the classification adopted by Frankland and others, and divide them into three classes—light yielding, heat yielding, and diluents. The hydrocarbons and marsh gas (light carburetted hydrogen) belong to the first class; hydrogen and carbonic oxide to the second; and water, carbonic acid, nitrogen, oxygen, &c., to the third.

The light-yielding hydrocarbons naturally attract the greater share of attention. Their examination presents special difficulties, owing to the comparatively small proportion in which they exist in the gas. When it is remembered that they represent only 3 to 10 per cent. of the entire volume, and comprise a considerable number of different substances, the difficulty of making a complete and accurate analysis is obvious; and investigators have found it necessary to proceed by various indirect methods, such as noting the specific gravity of the gas before the removal of the hydrocarbons, and again afterwards, or by noticing the difference in the quantity of carbonic acid and water produced by the combustion of the gas, and that obtained after the removal of the hydrocarbons by absorbtion.

In 1884, Mr. Lewis T. Wright contributed an important paper on this subject to the Journal of Gas Lighting,* in the course of which he questioned the accuracy of the general ideas on the constitution of coal gas. It was generally supposed, he said, that the luminosity of coal gas was due to a small percentage of heavy hydrocarbons (absorbable in fuming sulphuric acid) dissolved in a medium of non-luminous gas, the nature or composition of which exercises an influence on the luminosity afforded by the heavy hydrocarbons. The residual gas after the absorption of the latter was assumed to contain no combustible substances other than marsh gas, hydrogen, and carbonic oxide; but it had never been actually proved that these were the only constituents. He suggested that members of the paraffin series other than methane (marsh gas, CH_4), might be present. If this was the case, the carbon would be present in a more condensed form than in methane; and therefore in the calculated result the latter would come out too high, and the hydrogen, of course, would be too low in a corresponding degree. Mr. Wright maintained, in short, that the proportions of hydrogen and marsh gas were based on assumption rather than actual proof, and were therefore liable to error. He quoted several authorities for the belief that members of the paraffin series were likely to be present in coal gas; and stated that he was experimenting with a view of getting an answer to the question "What would be the illuminating power of coal gas if the absorbable hydrocarbons were absent?" He found that the residual gas had an illuminating value equal to one-half to one-third of the original value of the gas, as shown by the following experiments:—

Original Illuminating Power (corrected).	Illuminating Power after complete Removal of hydrocarbons absorbable by Fuming Sulphuric Acid (corrected).
18·03 candles	6·86 candles
16·28 „	9·02 „
15·10 „	4·72 „
14·60 „	4·60 „
16·07 „	5·58 „
18·51 „	8·30 „

It should here be stated that subsequently Mr. Wright and others found that marsh gas—formerly supposed to be a non-luminant—possessed a value equivalent to half that of ordinary coal gas. Looking at the proportion of marsh gas present, it is therefore to be expected that the residual gas should possess an illuminating value of about four candles.

Mr. Lewis Thompson considered that the quality of an illuminating gas might be arrived at to some extent by taking the specific gravity, and the percentage absorbable by bromine, into consideration. Though, as Mr. Wright has shown and as other considerations presently to be noticed will indicate, these particulars are only of use when taken in connection with others, yet the following table, showing the monthly average of daily tests made by Mr. Thompson on the gas supplied by the Great Central, City, and Chartered Companies respectively, in London, for a period of 14 months, are worthy of notice. They are copied from Vols. II., III., and IV. of the Journal.

* See Vol. XLIII., p. 910.

Month.	Great Central.			City.			Chartered.		
	Specific Gravity.	Absorbable by Bromine.	Illuminating Power.	Specific Gravity.	Absorbable by Bromine.	Illuminating Power.	Specific Gravity.	Absorbable by Bromine.	Illuminating Power.
April, 1852	—	4·4	12·5	—	4·1	13·4	—	—	—
May, „	·404	4·2	12·2	·410	4·4	13·5	·408	4·6	13·8
June, „	·404	4·2	13·4	·411	4·3	14·0	·413	4·1	14·4
July, „	·404	4·1	12·8	·413	4·2	13·7	·407	4·0	13·9
Aug., „	·403	4·0	12·7	·416	4·1	13·8	·404	3·9	13·2
Sept., „	·400	3·6	11·9	·409	3·9	13·1	·404	3·9	12·5
Oct., „	·402	3·6	12·1	·406	3·9	13·2	·404	4·0	13·3
Nov., „	·411	3·6	12·2	·407	3·9	13·3	·406	3·9	13·2
Dec., „	·412	3·9	13·2	·413	4·0	13·6	·411	4·0	13·7
Jan., 1853	·414	3·9	13·4	·413	3·9	13·7	·407	3·8	13·3
Feb., „	·403	3·6	12·9	·409	3·8	13·6	·405	3·7	13·2
March, „	·396	3·4	11·9	·412	3·9	13·3	·404	3·7	13·2
April, „	·401	3·5	12·0	·407	3·8	13·0	·401	3·6	12·4
May, „	·404	3·8	12·7	·410	4·1	13·6	·403	3·8	12·6

THE UNION OF THE GAS AND ALKALI INDUSTRIES.

By F. Bale, of Droitwich.

I beg to address you on what I am sure is a subject of importance to the readers of the Journal, to the gas and chemical industries of this country, and to our commercial prosperity. I refer to the alkali trade. By recent developments of the ammonia-soda process, the ammonia and chlorine or hydrochloric acid can be recovered, and the manufacture carried on at a fraction of the cost by the old process of Leblanc, which has now lost its last remaining prop; and the nuisance incidental to the old process is nearly eliminated in the new. There are other advantages, from a sanitary point of view, in the new process which I need not mention.

My chief object in writing is to point out that the recent developments of the new process make it essential that it should be carried on where coke, ammonia, limestone, and brine (or salt) could be easily obtained; and I am of opinion that no place is better suited for this purpose than one in connection with a gas-works, where these exist in the immediate neighbourhood of rail or water service. Two and often three of the four essentials for this process—viz., ammonia, coke, and lime—would always be at hand in most gas-works, and while gas managers are often at their wits' end to know what to do with their residuals, here is a very advantageous outlet for them. The lime required both for the gas and soda manufacture might be made on the spot; the carbonic acid being required for the soda manufacture.

I send you herewith a short abstract of a paper on this subject read by me before the British Association last year, which will perhaps be interesting to your readers; and should any further information be desired, I shall be happy to supply it.

There are other advantages, resulting from a combination of these industries, which I need not specify, not the least of which will be the security the gas industry will in future obtain against its young rival electricity.

Plant for this purpose, capable of producing one ton of soda-ash per day, and its equivalent of bleach, may be erected for about £2000, and larger works at this rate; and now that the change from the old process of alkali making to the new must evidently take place sooner or later, it would be well for gas companies to consider this question, and the advantages thus opened up to them. Brine, or common salt, would be the only thing requiring to be purchased in many gas-works for the complete carrying out of the new process; the reagents being recovered for use over and over again continually.

[Enclosure.]

THE RECOVERY OF THE AMMONIA AND CHLORINE IN THE AMMONIA-SODA PROCESS.

If ammonia chloride be volatilized, and its vapour passed over or through heated metallic oxide, at a temperature of 400° C. or higher, the ammonia which is evolved is partially decomposed in its passage over the heated oxide, and this to the extent of from 25 to 50 per cent. of the ammonia evolved. If, however, the ammonium chloride be intimately mixed in powder with metallic oxide in powder, as the oxide of manganese (which I prefer), and the mixture then slowly heated, the ammonia is gradually and completely evolved at a temperature of 130° C. to 325° C. without the loss mentioned above by the method of volatilization of the ammonic chloride. Most of the ammonia is here evolved between 180° and 200° C.

In this method of mixtures, if the temperature of the residue left after the evolution of the ammonia be kept below 350° C., and cold and dry air be passed over it, no chlorine is evolved at this temperature, but residual ammonia and moisture may be completely driven out of the retort on stirring the mixture. If the temperature be now raised to 350° C., the chlorine begins to be slowly evolved on the passage of dry air, when the oxide used has been manganese; and the percentage yield of chlorine by the peroxides of manganese is about one-and-a-half times that of any monoxide. Sesquioxides (M_2O_3) are unsuitable for this purpose, as they yield one-third less ammonia; the other third being decomposed into nitrogen and hydrogen.

The method of volatilization of the ammonic chloride means a high temperature, which means again a loss of ammonia and other disadvantages. By the method of mixtures a low temperature is employed, the ammonia saved, the chlorine fully evolved, and atmospheric air may be used to expel residual ammonia and steam remaining in the retort; and if the temperature be kept below 350° C., air may be passing through the retort during the whole operation for the ammonia—thus removing the ammonia and steam as formed, and preventing loss of ammonia and the formation of hydrochloric acid when chlorine is required.

Oxides of the heavy metals, and the alkaline earths and salts formed from these, may be used for this purpose with more or less advantage. There is one oxide, however, which appears superior to all others—viz., the oxides of manganese which are not sesquioxide. These oxides (Mn_3O_4 and MnO_2) evolve ammonia at a low temperature. From 130° C. to 200° C. most of the ammonia is evolved, and at 325° C. is completely evolved by these oxides. The percentage yield of chlorine by these oxides is one-and-a-half times that of the monoxide of nickel and others. For these and other reasons, I think they will hold their place in the new process as they have in the old process of Leblanc.

Peroxides of the composition M_3O_4, MO_2, may be used with advantage both for the evolution of the ammonia, and after for the chlorine on the passage of air, and for the evolution of the hydrochloric acid on the passage of steam at the low temperature employed.

The workman would keep the temperature below 350° C. during the evolution of the ammonia. This may be done by a mercurial thermometer placed in the door of the retort. Other heavy oxides, salts, &c., require a much higher temperature for the evolution of the ammonia and chlorine.

When all the chlorine or hydrochloric acid is evolved, the residue is equivalent when reduced to the oxide with which we started, and will give the equivalent of ammonia as at first when heated with ammonic chloride; and from this point the round of operations goes on continually.

The apparatus required would be a Stourbridge fire-clay retort, or other suitable furnace or retort, heated by gas, or preferably by a self-feeding coke furnace. These retorts may be worked in series and connected with pipes leading to the ammonia-absorbing plant, the hydrochloric condensing chambers, and the bleaching-powder chambers. They should also be connected with an exhauster or blower for the passage through them of air or steam when chlorine or hydrochloric acid was required.

The residual oxides left after the complete evolution of the chlorine or hydrochloric acid would need washing at intervals from common salt; and when manganese has been the oxide used, they exist chiefly as sesquioxide of manganese, and before the charge of ammonic chloride is added they must be reduced. This may be done by heating them with charcoal or small coal, or better by passing the gases from the coke or other furnace used over them, when they will no longer decompose the ammonia when used for the next round of operations.

The lime now used is thus saved, the ammonia and chlorine fully recovered, and reagents for this purpose recovered for use over and over again continually; and this for no other cost than the labour and fuel employed (which is small) and the wear and tear of retorts.

The notice of motion in relation to legalizing the use of the portable photometer, which has been given by Mr. Benn (as already mentioned in the Journal), stands tenth on the *agenda* paper for the meeting of the London County Council to-day.

Last Wednesday, the Metropolitan Board of Works passed out of existence; their functions being assumed, by an order of the Local Government Board, by the County Council for London. Most of our readers will remember that the Board was constituted under the provisions of the Metropolis Management Act, 1855; and an account of their labours in connection with the gas and water supply of the Metropolis, during the 33 years of their existence, as given in their last annual report, will be found in recent issues of the Journal (*ante*, pp. 402, 445).

The list of officials for the coming meeting of the British Association, which will take place early in September next at Newcastle-on-Tyne, under the presidency of Professor Flower, F.R.S., has just been arranged. Captain Abney will preside over the Mathematical and Physical Science Section; Sir I. Lowthian Bell, F.R.S., over the Chemical Science Section; Professor Edgeworth, M.A., F.S.S., over the Economic Science and Statistics Section; and Mr. W. Anderson, M. Inst. C.E., over the Mechanical Science Section. The following are the arrangements for the meeting, as far as they have been completed:—The first general meeting will be held on Wednesday, Sept. 11. The succeeding evening there will be a *soirée;* on Friday evening, a discourse on "The Hardening and Tempering of Steel," by Professor Roberts-Austen, F.R.S.; on Monday evening, Sept. 16, another discourse; and on the next evening a *soirée.* Excursions to places of interest in the neighbourhood of Newcastle-on-Tyne—including, of course, the Roman Wall—are being arranged for Saturday, Sept. 14, and Thursday, Sept. 19.

The Winterthür Correspondent of *Industries* says: "The Town Council of Zürich have appointed a Committee of experts to report upon the question of lighting the town electrically. The Committee have begun their work by ascertaining the probable demand for current in different parts of the town, and, on the basis of the figures obtained, have elaborated a scheme on which the Council now invite tenders. Since the electric light has been introduced in Geneva, the Gas Company of that town have brought an action against the Municipality for breach of contract and interference with their monopoly. The Company claim to have the sole right not only of doing the public lighting, but also of using the streets; and in both respects the Electric Lighting Company have infringed their rights The Gas Company brought, in the first place, an action for damages against the town, in which they failed. They have now appealed, but unsuccessfully. In the appeal the Company claimed either to have a monopoly, or to be relieved from the obligation of paying, as hitherto, 30,000 frs. per annum to the town for the privilege of being permitted to sell gas to private consumers. Even in this claim the Company were unsuccessful, and they will, therefore, have to pay during the rest of the term of their concession, which expires after eight years, a total of 240,000 frs., or nearly £10,000, notwithstanding the vast increase in electric lighting which within that time will probably take place, to the detriment of the sale of gas."

In the course of the address delivered by the Chairman (Lord Rosebery) last Thursday, at what was in reality the first meeting of the County Council for London in the full possession of its functions—the Council having only on that day assumed the duties discharged by the defunct Metropolitan Board of Works—he alluded to the fact that the Council had decided to limit the length of speeches on the questions under debate. There had, he said, been only one exception to the 15 minutes' rule they had adopted—viz., the principal speech on the subject of the coal and wine dues, which was a most important matter. Referring to the question of water supply, which (as reported in another part of the Journal) engaged the attention of the Council at their meeting last Tuesday, Lord Rosebery remarked that this subject, which had already wrecked a powerful Government, was introduced to them in a speech which, for compactness of statement and boldness of debate, was a very model of what such a speech should be. In view of the magnitude of this question, which the Council had taken up "with a light heart, in the spring of its vigour and manhood," he did not think anyone could allege that too much time had been devoted to its discussion. He concluded by expressing his confidence that the Council would proceed with "daring caution," seeking truth, and not afraid to face it when they found it; adding the hope that they would prove able so to elevate the City in which they lived, that London might in the future look back upon its first Council with a feeling of gratitude.

Technical Record.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

The First General Meeting of this newly-established Association was held at Grantham last Wednesday, under the presidency of Mr. W. BARRATT, the Engineer of the gas-works. In all respects the meeting was a great success, and promises well for the future of the Association. With two or three exceptions, all those who attended the preliminary meeting held at Peterborough in September last, with the addition of some new members, were present, and one and all took a lively interest in the proceedings of their first formal gathering. The members met at the gas-works at 12.30 p.m., and were forthwith photographed beside the largest of the three holders—a two-lift one. Refreshments (kindly provided by the President) were afterwards partaken of; and then some of the members made a tour of the works, which have been under the control of Mr. Barratt for the past fifteen years. About two o'clock the members assembled at the Guildhall, where the business portion of the day's proceedings was at once taken in hand.

The HONORARY SECRETARY (Mr. H. Wimhurst, of Sleaford) read the minutes of the preliminary meeting, held on Sept. 26 last; and they were confirmed.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Having elected me first President of the Eastern Counties Association of Gas Engineers and Managers, let me assure you I highly esteem the honour you have conferred upon me. I feel some little diffidence in addressing you. Still, I remember the words of our immortal Nelson, "England expects that every man this day will do his duty;" and I remember also that we are assembled here to-day with the common object of imparting and receiving instruction and information upon those great subjects which are to us, individually and collectively, of the highest interest and of the first importance, and therefore I will do my best to lay my views on several topics before you. I am fully convinced that I express the sentiments of all present when I say that but one feeling pervades us, and that is a sincere desire, without bias or reserve, mutually to assist and inform each other, by an interchange of our varied experiences, in the scientific and mechanical details connected with gas manufacture and distribution. As I take it, our primary object in assembling here to-day is, how best to accomplish this desirable end.

You will observe we have departed from the ordinary methods of routine. Your Committee thought it best not to ask any member or members to read papers, but to give us their opinions without committing their thoughts to paper. That is departure No. 1. Then, gentlemen, the next is, we have done our best to free ourselves from those things which have led to so much mischief in other quarters. Your President and Committee will be chosen by yourselves and from among yourselves, without any dictation whatever from any quarter. Cliqueism must have no part in this Association; everything must be open and above-board. What have honest men to fear? Much has been said of late, and with a flourish of trumpets, as to representation—National Representation. That may do very well for children—spoiled children who have ruled so long, and who, finding their days numbered, now endeavour to set up a National Representative Organization. Gentlemen, if I understand this matter aright, you represent me, and I represent you; and if this idea be carried out properly, your Association will be one of the best for quickening thought, heightening moral consciousness, and making us feel we are bound together by thoughts, principles, and motives as sound as any National Representative Organization can possibly be.

Gentlemen, the manager of a gas-works to-day must be a *man*. "Kid and Glenfield" might do at one time, when things were carried on by rule-of-thumb; but when we remember that the gas manager has oil on one side and electricity on the other to contend against, there is greater necessity than ever that he should know his business. Everything must be studied—retorts, ascension-pipes, hydraulics, condensers, scrubbers, purifiers, gasholders, mains, service-pipes, meters, street-lamps, fittings, and burners. These and a number of other things must occupy his mind; and withal gas must be made good and cheap. It is our duty to make ourselves masters of these things in every detail. Let me ask, Are our retorts set in the best way possible for standing the greatest heat at the least cost of fuel and general wear and tear? I think a great deal needs to be done in the direction of improving retorts and settings. Of course, I do not refer to any special patents, call them by what name you will. I think there is a future for them; but great improvements must be made before they can be generally adopted. I am acquainted with some engineers who would be pleased if they had the money in their pockets they have cast away upon so-called improvements. Then, gentlemen, there is the ever-recurring question of stopped ascension-pipes. Can these be prevented? Yes, they can. I mastered the difficulty twelve years ago, and have not had twelve stopped pipes since. If you ask me, How? I answer, by adapting means to ends. I have noticed that some engineers appear determined to have everything perfect outside their retort-houses; but when one enters the house where the money is to be made, one is struck with the disproportion of the ascension-pipes for the work they have to do in the position in which they are placed. I remember some time ago visiting a large gas-works, not a hundred miles from where we are now. There I found a bench of something like a hundred 20-feet through retorts 20 inches by 15 inches, with ascension-pipes commencing at 4 inches and finishing at 2½ inches fixed so near the front wall that cold air could scarcely get between them. This brother engineer wished to work with high heats; but what was the consequence? Just what you might expect. I was informed that after the retorts had been at work a short time, a large number of ascension-pipes were stopped; and the men had to be kept working night and day to jump these pipes clear. As to the loss, the least said the better. If you wish to get rid of this nuisance and loss, make your mouthpieces longer from flange to front; start with 6-inch pipes and finish with 5-inch. Have no sockets cast on your mouthpieces, simply a 6-inch hole and flanges on your ascension-pipes to rest on the mouthpieces. Make all your joints as smooth and true as possible. If you do this, my experience tells me you will obviate that nuisance—stopped ascension-pipes.

Then, gentlemen, I wish to draw your attention to another matter of considerable importance. In visiting some works I find pipe condensers of 5 and 6 inches diameter. In others, I find condensers 8, 9, and even 10 inches. Both works make as near as may be the same amount of gas. Can this be right? Either one has too much, or the other too little—both cannot be right. And then, again, if the one manager with 8 or 10 inches has no more than he requires, then the other has too little. What about his summer make if he has no means of controlling his condensation? I am aware that in summer condensation is not so rapid as in winter; but the experience of last winter, I think, warns us that something needs to be done in the direction of improvement. I know there are other forms of condensers; but the question to be settled is, Is any form of condenser sufficiently under the control of the engineer or manager, considering the effect condensation has on the quality and purification of gas? I do not forget about the scrubber and washer; but is the scrubber and washer to do a part of the work the condenser ought to do? When the condenser is at fault I am of opinion that a large amount of illuminating power is lost. Perhaps some of you gentlemen will take this matter up, and favour the Association with your views. If I am right in my opinion, then the matter is of serious importance, because we may have greater loss than we are aware of; and where you are bound to give a high illuminating power, cannel—dirty cannel, as I heard it spoken of the other day—an expression quite new to me (and, parenthetically, let me add the Leeds Corporation's experience almost proves there is no such thing)—has to be resorted to to make up what is lost. This is an expense we cannot afford now-a-days; and, in my opinion, it should not be incurred. I think there are coals to be obtained which, if properly manipulated, will give from 10,000 to 11,000 cubic feet of 17-candle gas per ton—that is, if condensation be what it ought to be.

And whilst I am speaking on the subject of coal, permit me to inquire if nothing can be done to protect us from the inconvenience and loss consequent on colliers' strikes. Here we are, a number of gentlemen charged with the responsibility of giving light to the whole of the towns in England; and in the very busiest part of the year, we are threatened with a stoppage of our coal supply. If the supply is not stopped altogether, we are often most seriously inconvenienced, and not unfrequently have to suffer severe loss. We make our contracts, as a rule, during the summer months; and yet in the very worst part of the year, these men (goaded on by so-called members of Parliament) refuse to work unless their demands are complied with. I am of opinion that something ought to be done—either by legislation or by some other means—to put an end to this sort of thing. I think time could not be better spent than by the Presidents of all Associations connected with the manufacture and distribution of gas meeting and discussing this very important subject, and reporting thereon. Again, I find, by rumour, at least, a syndicate is to be formed in London with the intention of buying up all fire-clay manufactories in England, and, as a consequence, of raising the price of fire-clay goods. If proprietors are so unwise as to lend themselves to this sort of thing, we must not be wanting in means to supply ourselves; and if all gas companies and corporations combine, these syndicate gentlemen may be taught a lesson that will last some time.

On the matter of subsidizing rates out of gas profits, let me inquire if you think it right to sell gas at a high price for the purpose of making a profit to be applied towards the reduction of rates? I have neither seen nor heard any valid reason advanced for such a policy. Perhaps some one will give us his views on this important subject. In all towns there are a number of houses in which gas is not to be found. In Grantham nearly 25 per cent. of houses are not supplied with gas. What is the reason? It has been averred that if you make gas good and cheap, all householders will take it. This is nonsense; at least, it is not my experience in Grantham. We give from 16 to 17 candle gas, at 2s. 6d. per 1000 cubic feet. We put in all services, find taps, and fix meters free of charge to the consumer; so that every opportunity is given for taking gas. When I came to this Company, the price of gas was 5s. per 1000 cubic feet, services and taps were charged for, and a charge was made for fixing meters; and the cry of the consumers—the public—was, "Improve the quality, and reduce the price." We did so; but our increase of new consumers was not what we were led to expect—our increase of consumption has been with all old consumers rather, and not by the addition of new ones. When I came to

Grantham our make was only 32 million cubic feet; at present it is 63 millions. It is neither quality nor price which stands in the way in many cases of increased consumption, but poverty. The people are too poor to put fittings in themselves; and the landlords will not do it for them, as they say it will not pay. I suppose there are in Grantham, as in other places, a great many jerry buildings, especially of a certain class of house. Not long since we laid 4-inch mains in two streets, to the length of about 400 yards; the houses being mostly for the labouring and mechanic classes. We only got five customers out of something like a hundred houses. The landlords refused to put pipes and fittings in; and the tenants were too poor to pay for them. Another drawback has been the quarterly gas account—6s., 8s., and 10s. per quarter, which few can pay. I shall rejoice when some friend will perfect an automatic meter, where a penny can be dropped in, and out comes a pennyworth of gas. I hear there is a move in that direction; but practical demonstrations are wanting.

Gentlemen, I do not wish to weary you. A great number of things will be brought before you, and all will have opportunities of giving vent to their pent-up views and feelings, as time goes on. Let me in conclusion say—never forget that you are public servants; and seek to accommodate the public as far as possible. The manager of a gas-works requires to be a kind of walking encyclopædia—he is expected to know everything. In our position as managers, we are looked upon by some people with no small degree of distrust. They think that we exercise some kind of legerdemain—that we have power over the gas-meter, and can make it go fast or slow (oftener fast than otherwise) by just simply looking at it; that it does not matter whether they burn much or little, or even none at all, the gas bill is the same. Again, we are charged with pumping air into the gas, so as to increase our profits; and that, no matter how much the price of gas is reduced, the gas bill always increases, and consumers have more to pay. How are we to dispel this prejudice? First, we must know our business, not only in manufacture, but in distribution up to the point of the very burner. A great deal of this prejudice may be removed by the manager showing himself to be thoroughly acquainted with every detail. He is not to dream that he has done all he can, or ought to do for the consumer when he has laid the service and fixed the meter. Perhaps he may fall into the hands of an unprincipled plumber or gas-fitter, who, in order to obtain a little more profit, puts in pipes too small for the light required. The consequence is, there is not half sufficient supply, and the light is faulty. Then, in order to cover his bad work, the gas-fitter throws the blame on the gas company's manager, and thus the manager is made the scapegoat. We must be in a position to state the nature, width, and strength, of all pipes fixed in any house, office, or premises to supply from one to a thousand lights; the size and character of connections and joints; how the work is to be done; and, if necessary, take the tools and do the work ourselves rather than lose both customer and character. Bad work and insufficient pipes not only throttle the supply of gas to different parts of an establishment, but often leave small escapes—can there be a greater nuisance?—which, in an ordinary way, cannot be found out. But you are in a position, or ought to be, to do this. All you have to do is to put on a little extra pressure, make the room dark, and you will not be long before you discover the leak. If you succeed, is it likely you will be forgotten? No! certainly not. Then as to fittings and burners. In the midst of the rage of the present day for cheap articles, you must be in a position to advise customers which is cheapest and best, and how to have them placed in their rooms so as to give or distribute the greatest amount of light for the least possible consumption of gas. Never be afraid of saving your consumer's gas bill; it will come back to you in longer measure. Then, with respect to burners; their name is legion; and we must make ourselves thoroughly acquainted with them. If you ask me which I think the best, I am dumb; this must be left to each individual manager. I need not tell you that a certain burner may be good for 14-candle gas, but use that burner with 16 or 17 candle gas, and you will soon find that you had made a great mistake, in the deposit of carbon on the ceiling and furniture. And why? Because the burner was all right for the quality first mentioned; but is not at all adapted for the second. When gas is too good for the burner, thorough combustion does not take place; the air in the room becomes vitiated by the products; gas bills become larger than they ought to be; and no good results to anyone. I need not inform you of the number of burners and burner makers—they are numberless. Make yourselves acquainted with a few of the best makers; know the quality of the gas you deliver; and have burners suitable for producing the best light at the least possible cost. Although I am tempted to refer to the large number of burners of various kinds, patent and otherwise, which we have heard of in recent times, I find I must leave that subject for your own consideration.

Let me call your attention to another subject of great importance—viz., meters. Wet or dry, have the best meters that can be obtained; take no man's word; but in the case of meters, as well as burners, test for yourselves, and have no meter fixed but the one your testing tells that you can rely upon. Perhaps you may say, ought not the Sales of Gas Act to protect us? No doubt it should; but did you ever know an Act of Parliament do all it professed, or that its authors intended? The inspectors are bound by the Act; but the Act never has been right, and the tests made are not sufficient. The prescribed form states that gas must be passed at a high pressure for soundness; and, if it stands the pressure, then it is passed on for correct measurement, so much gas being passed through per hour according to size. But is it not a fact that meters passing a smaller quantity give different results, not favourable to the gas company, and that some do not register at all?

A number of other things press themselves on my attention. Sunday labour in gas-works; the best machinery for the manufacture of sulphate of ammonia; purification; street lighting; rating of gas-works; and a hundred and one other things. But these must be left for after consideration. I shall conclude by expressing the hope and trust that every member will do his best to make this Association a grand success.

At the close of the address,

The PRESIDENT remarked that it was then open for any gentleman to express his opinion upon any subject he might have upon his mind; and he hoped the meeting would do so freely. [It may be mentioned here that the President had previously intimated to certain of the members his wish that any points worth discussing in his address might be taken up and dealt with at the present meeting.]

Mr. J. BARTON (Peterborough) said he thought they were all highly indebted to the President for the able address that he had given them; and he considered the least they could do was to pass a hearty vote of thanks for the time and attention that he must have devoted to the preparation of the address. There were one or two matters in the address in which he (Mr. Barton) did not quite follow the President. He would begin with the question of ascension-pipes. His experience was not exactly in accord with the President's—that was, so far as regarded the make of the pipes. The President recommended flanged joints; but his experience with these joints was, he was sorry to say, a troublesome one. No doubt this might be on account of the material with which the joint was made. Whether that was so or not, he did not know. The difficulty was to keep the joints gas-tight; and the expansion and contraction in the flanges and bolts of course did not go to help this. He had adopted socket pipes—all the pipes at their works being of this kind, and with rust joints. He thought it was essential that the scrubbers and condensers should do their share of the work; and he quite agreed with the President that it was very important that they should do their duty, and the purifiers theirs. As to the question of coal, he did not know what to say about that. He could not see how they were to avoid strikes, unless the colliery proprietors would give the men all that they required. (Laughter.) The rating of gas-works was also an important matter. He had lately had some experience of this. His Company lost their case, he was sorry to say; and this had placed them in the position of being one of the highest-rated gas undertakings in the kingdom.* Their rates and taxes, before the assessment was revised, amounted to 3·18d. per 1000 cubic feet of gas sold. The Assessment Committee revised the assessments in the town and put up the Company £1600—from £2000 to £3600. They appealed against the assessment, but to no purpose; and it still stood at £3600. Their rates and taxes would amount to between 5d. and 6d. per 1000 cubic feet of gas sold. He did not know whether any other undertaking was rated quite so high as this. However, it came to a question for the ratepayers—the money came out of the pockets of the gas-consuming ratepayers, who had to "pay the piper." Another point mentioned in the President's address was that of gas-fittings. This was a very important subject no doubt; and he thought it was essential that gas companies should take the matter into their own hands, and see that the gas-fittings were as they ought to be—the pipes of a proper size for the number of lights likely to be used, and the burners of the right kind for the quality of gas made. In his own case he was sorry to say they did not do gas-fitting; and consequently they laboured under great disadvantages. If a consumer consulted him as to what he should do with regard to fitting up his house or any public building, he was always willing to give his opinion and advice. This was what he thought they all ought to do who did not do gas-fitting. He considered they should give advice gratuitously to gas consumers as to the proper size of the fittings and burners they should use. He often found that gas-fitters took contracts for certain work; while their game was—well, they would do it as cheap as they could. The fitter said to himself, "The more profit I can get out of this job, the better for me, and the gas company can go to Jericho, as far as I care;" and so he simply used his discretion as to what should be done. With these few remarks he proposed a hearty vote of thanks to the President for his able address; and he trusted the proposal would be carried with acclamation.

Mr. W. J. BEST (St. Ives) seconded the proposition.

The motion was carried with applause.

The PRESIDENT, in acknowledging the compliment, said he need scarcely assure the members that anything he could do for the welfare of the Association he most certainly would do. Ever since they had elected him President, he had endeavoured to do the best he could; and he should continue to do his best to further the interests of the Association so long as he was connected with it. He should now like to hear a few remarks from their well-known friend Mr. C. E. Jones.

THE CONDUCT OF ASSOCIATION MEETINGS.

Mr. C. E. JONES (Chesterfield) said he must congratulate the members most decidedly upon the formation of the Eastern

* See *ante*, p. 295.

Counties Association. He had lived long enough to know that the highest and most valuable information which was accorded to gas managers consisted in that which was disseminated by small societies; as when societies became unwieldy, petty jealousies, influences, and "axes to grind" came in on all sides. Such influences he hoped—at least his experience pretty nearly up to date showed it—did not obtain in small societies. That an Association of this character was needed in the Eastern Counties was apparent by the hearty response which had been given to the invitation of the Committee for applications for membership. He was sure he need not say how heartily they, as gas men, wished entire success to an Institution of this kind. He thought he might say that all gas men throughout the country were beginning to more and more appreciate the value of District Associations. In them they had the means of disseminating knowledge which was not only local but general in its application. They used to a large extent the same kinds of material; they had the same atmospheric conditions to contend against; and in many cases they had the same prejudices—the same peculiarities of the community; and therefore a representative Association of this character for the Eastern Counties was very essential. It had his hearty support; and he might say the support of all men who wished well to the gas industry. He congratulated the members upon their choice of their first President. A gentleman eminently qualified for the position was his friend Mr. Barratt. The Association had also an able and enthusiastic Committee; and he had no doubt whatever that, under the guidance of his friends, the Association would go on and prosper. There was one point, if the President would allow him, to which he wished to allude, although it was commonly said of a man who gave advice that, unless it was paid for, it was never respected. As professional men, they, of course, liked to give that advice which was paid for; but on this occasion, if they would permit him, he would offer a little advice for which he would not charge anything. (Laughter.) Now, he took it, with all due respect to the mover and seconder of the resolution thanking the President for his address, that it was a very bad practice to discuss the presidential address. If they began to do this, the inevitable effect would be that Presidents would avoid controversial subjects; and they would oftentimes smother in its birth an idea which might come forth and bear fruit in the future. He hoped they would not continue the practice of discussing the President's address. Rather, he should say, take the presidential address as a whole, and read it at leisure; pick out any points of weakness in it—if there were any—or points that required further elaboration; write a paper upon these matters, bring them before the Association, and then thrash them out. This was one point. Another was that he hoped the members would always endeavour to respect the chair. They had seen in the past some very strong societies go down under weak presidentship. He was very much grieved the other day to see in Manchester a very unfortunate scene, in which a local society had gone down in his estimation a considerable number of points per cent. through not obeying the chair. He once saw in London a gentleman who said they had to go to Ireland to fetch an Irishman to keep a meeting of Englishmen in order; and in a quarter of an hour the theatre in which they had met—at the Institution of Civil Engineers—was rather like some Donnybrook Fair than anything he ever saw in his life. And why was it? Because there was no respect paid to the chair. In all their dealings he would ask them, whoever should be the chairman, to respect the position, even if they did not love the man. He trusted, without discussing the very able address which they had heard, they would take it to heart, extract a few points which their President had thrown out for consideration, and in time to come bring before the members papers upon these various topics, which would redound to their own personal credit and enhance the value of their meetings. No man, except one who had written a paper, knew how much benefit it was to himself. The mere matter of having to collect materials and to put them into a state to bring before the members for argument, and then to find how mercilessly they were torn to pieces afterwards, was the finest training that he knew of for a young man. He hoped they would have many gentlemen who would take the liberty he had just indicated. He could only say, in conclusion, that he sincerely trusted the President's year of office would be fraught with much good to the members; and he was perfectly satisfied it would redound with honour to him.

Railway Rates for Coal, Etc.

The President said he understood Mr. Carter had something to say to them on the question of railway rates for coal.

Mr. J. Carter (Lincoln) said it had occurred to him, before he read the article by Mr. J. Fergusson Bell, of Stafford, which recently appeared in the Journal of Gas Lighting, in regard to the proposed new rates for coal under the Railway and Canal Traffic Act, 1888, that this was a matter which the District Associations of Gas Managers ought to take up, as there were several points connected with the new regulations to which the railway companies were seeking to obtain the sanction of Parliament which would press heavily, severely, and disastrously upon the gas industry. The main difficulty appeared to him to be in reference to classification; and, as far as he could ascertain, coal and coke would remain in the same classes with regard to the rates levied for their carriage as they did under the old legislation. As to the rates for chemical products, tar, and ammoniacal liquor, he saw that the maximum rate was to be much higher than the railway companies might levy at present under the old legislation. It was increased to an additional extent by the fact that these materials were placed in a different class—a class higher, which subjected them to heavier rates than those charged at the present time. They could only judge as to how this matter would affect themselves by looking carefully at the question. Taking the carriage of coal from South Yorkshire to Lincolnshire, he found the maximum rate proposed was no less than 2s. 6½d. per ton higher than the maximum the railway companies now enjoyed. Take the question of terminal charges, under existing legislation the companies were allowed to impose a "reasonable" sum. With an elastic charge like that, what the railway companies might suppose to be a reasonable sum, they, as gas managers, would imagine to be in some instances most unreasonable. In his own case the sum levied for terminal charges amounted to only 2d. per ton of coal under the existing legislation. The railway companies were now proposing to levy maximum terminal charges of 14d. per ton. The increased maximum rates would make a difference, as he had said, of 2s. 6½d. between the maximum rates obtaining now and those the railway companies were seeking to charge; and he took it these facts would apply proportionally in every case and to every gas company or corporation having the control of gas-works. Seeing that it meant an additional charge of 3d. or 4d. per 1000 cubic feet of gas made, he thought this alone was quite sufficient to bring home to their minds the great importance of the subject. Whether or not they could do anything, in conjunction with other District Gas Associations, for the purpose of reviving the present charges against the maximum charges the railway companies were seeking power to enforce, he did not know. They could but try; and he would propose that the Secretary should place himself in communication with the Secretaries of other District Associations for the purpose of ascertaining whether some loud and emphatic protest should not be made by the gas industry against the rates and charges the railway companies were seeking to have enforced.

The President said he should like to hear what Mr. Jolliffe had to say on this question.

Mr. J. T. Jolliffe (Ipswich) observed that he really knew very little about the matter which Mr. Carter had brought forward. He was afraid it had been so short a time before them that they could hardly have given it the attention that was necessary. He could not help thinking that railway companies were something like gas companies—they were looking out for dividends for their shareholders. Gas companies liked to get the maximum price they thought would enable them to pay the shareholders their maximum dividends. Although he had a great deal of sympathy with Mr. Carter in trying to get these charges reduced to the minimum, he must confess he felt some diffidence in going against the railway companies in this direction.

The President pointed out that Mr. Carter's motion had not been seconded. Of course, these rates would affect gas companies if the railway companies obtained the power to levy them. As far as he was concerned, he would not give the latter any more power than they at present possessed.

Mr. Jolliffe said he did not think any harm would be done if the Secretary put himself in communication with the other District Associations on the subject. Although he confessed he thought they could do very little against the railway companies, he was quite willing to second Mr. Carter's proposition.

The motion was carried.

The President said he had just been informed that the Board of Trade had granted two months' grace in this matter; so that the thing could be thoroughly thrashed out. Originally, all demurs were to be sent in by the end of this or early next month; but the Board of Trade had extended the time.

Discussion of Presidents' Addresses.

The President said he wished it to be clearly understood that Mr. Barton had not committed any breach of etiquette in regard to the address. He (the President) challenged discussion of it; and the address had been prepared with this intention. He dissented entirely from Mr. Jones's view with regard to it that the President's person and his address should be so sacred that no one dare put his finger upon them. As to the railway rates, about which Mr. Carter had spoken—well, all he had to say was, "Bother to them." He had had a great deal to do with them during the past week; and the matter would have to be attended to in some form or other. The Secretary had received a number of applications for membership, and he would now read the names.

New Members.

The Secretary then read the following list of gentlemen, whom the Committee recommended for election as members of the Association.

Barrett, F. C.	Assistant Manager	..	Grantham.
Bloodworth, H.	Manager	..	Bourne.
Drage, A.	"	..	East Dereham.
Drewry, W.	"	..	Cleethorpes.
Jones, C. E.	"	..	Chesterfield.
Lees, J.	"	..	Goole.
Manwaring, W. H.	Assistant Manager	..	Lincoln.
Pask, J. O.	Manager	..	Bungay.
Sharman, R. J.	"	..	Wisbech.
Wilkinson, T.	"	..	Newmarket.

The recommendation was approved.

Papers for Next Meeting.

The President invited promises for papers for the next meeting; but no one responded.

PLACE OF NEXT MEETING.

Mr. A. J. YORSTON (Ely) proposed that the autumnal meeting of the Association should be held at Ipswich.

Mr. JOLLIFFE said that if the Association decided to go to Ipswich, he would do his best to make the meeting a success. He considered, however, it would be better for the Association to choose a central town at which to hold the next meeting. Perhaps some members, too, would prefer to follow the lines laid down by other societies, and visit the town of the President for the time being. Of course, he should be glad to see the members at Ipswich; and he would do his best to make the meeting a success.

Mr. BARTON thought the Association should certainly get a little farther into the Eastern Counties. Their meetings had been held so far north; and they ought to go among their fellow-managers a little farther east.

The proposition was agreed to.

The PRESIDENT said he was sure they were all very much obliged to Mr. Jolliffe for his courtesy. As they had a few minutes more at their disposal, perhaps Mr. Bridge would like to say a few words.

VOTES OF THANKS.

Mr. R. BRIDGE (Doncaster) expressed his obligations to the President for calling upon him. There was one little matter that was troubling the minds of himself and Mr. Jones. They had a certain duty to perform. The thanks of the meeting were due to the President for directing the affairs of the day's meeting. He should like to add his testimony to the very admirable introductory remarks which he had made, and the grand lessons the address had put before them as gas manufacturers, and which would be helpful to them in the future.

Mr. JONES said he should like to be permitted to second the vote of thanks. He had heard, in the course of his experience, a great many presidential addresses; and though it appeared to be a foregone conclusion among the Committee that they were to discuss the address on this occasion, he still adhered to his opinion that it was a mistake. He was perfectly satisfied that the members were highly indebted to the President for the manner in which he brought before them the various matters connected with their industry. There was one other point, however, to which they would have to direct special attention; and this was the question of oil, which was now being introduced into this country duty free. It practically had no rates and taxes to pay; and therefore it entered into competition under these advantages with coal gas. This was an important matter, and might be thrashed out by one of their friends at a future meeting.

The resolution was heartily carried.

The PRESIDENT said he was exceedingly obliged for the way in which the members had received the remarks he had made. If his address benefited anyone, or helped a member over any difficulty, he would be amply satisfied. He thought it should be the duty of a President of an Association to occupy, in some sense, the position of father, and that any young man who had any difficulties should communicate with him, and obtain help out of his trouble. He did not think sufficient was made of this; and he had often thought over the matter. He recently heard of a case in point, in which the chairman of a company had to go to London when there really was no need. The manager was a young man with very little experience; and if he had just communicated with the President of the Association of which he was a member, he could have relieved him at once; whereas his chairman had about six guineas to pay for advice that he might have obtained for a mere "thank you."

Mr. JOLLIFFE proposed a vote of thanks to the Secretary.

Mr. F. WELLER (Great Yarmouth) seconded the motion.

The PRESIDENT supported the proposal; remarking that their Secretary was an indefatigable fellow. He was never tired; and he did not mind how much work was put upon him.

The proposition was carried with acclamation.

The SECRETARY thanked the members heartily for the vote they had accorded him. What he had done for the Association had been a work of pleasure, as all he had to do in the future would be. He hoped they would have many such pleasant half-yearly meetings as the present one.

This concluded the business of the meeting.

VISIT TO THE SPITTLEGATE IRON-WORKS.

The members were next conducted to the world-famed iron-works of Messrs. Hornsby and Sons, Limited. This firm was established in 1815; and some idea of the magnitude of their operations may be formed when it is stated that something like 16½ acres of ground are required for the buildings, plant, &c., and no less than 1400 men are employed in turning out "all sorts and conditions" of machinery. Before making a perambulation of the works, the members gathered in one of the rooms at the offices, where was displayed a large collection of medals, of which the firm are justly proud. A few appropriate remarks were here made by the President and Mr. C. E. Jones, on behalf of the members, who heartily concurred in the vote of thanks proposed by the former to Mr. F. C. Southwell, the General Manager of the works, by whose kindness they were allowed to visit the establishment. Mr. Southwell briefly acknowledged the compliment; and then personally accompanied the members over the works (a large portion of which time would not permit them to inspect), pointing out the most interesting features of the operations which were proceeding. The hour and a half which the members spent upon the works rapidly rolled away; and many were the expressions of surprise by the members at what was seen by them.

The day's proceedings concluded with a meat tea in the Grantham Club Rooms, to which the members and a number of friends were kindly invited by the President. Several toasts were afterwards proposed and duly honoured; and special recognition was made of the manner in which the President and Mrs. and Miss Barratt had attended to the wants of the members and visitors.

Members desiring to obtain copies of the photographs taken of those present at the above meeting can do so by applying to Mr. H. J. Bliss, London Road, Grantham.

SOUTH-WEST OF ENGLAND ASSOCIATION OF GAS MANAGERS.

The Twenty-Third Half-Yearly Meeting of this Association was held at Bridgwater Gas-Works on Tuesday, the 12th inst. The PRESIDENT (Mr. J. H. Cornish, the Engineer and Manager of the Bridgwater Gas Company) occupied the chair.

The formal business which first occupied the attention of the members was recorded in a summary of proceedings published in the JOURNAL last week; and to-day we commence the full report of subsequent matters brought before the meeting.

THE QUESTION OF PAPERS.

The PRESIDENT asked for promises of papers for the next meeting, especially from new members, and from those who had not hitherto assisted in the proceedings.

Mr. S. W. DURKIN (Southampton) said it had been suggested to him that he should act the part of a "stirrer up" on this important subject. He had contributed papers to the meetings in times gone by, but had not come forward lately, because he felt there were gentlemen belonging to the Association well able and competent to prepare papers who had not yet done so. There were many who attended the meetings, and yet held back from giving the benefit of their experience to their fellow-members. The same thing had been noticed in other Associations, that the majority of the members held off from taking any prominent part in the proceedings; the bulk of the work being done by a comparatively small band of willing workers. Then, after a time, it began to be rumoured that the Association was managed and controlled by a "clique." He was sure that if each member would only take his fair share of the burden, and come forward and assist in carrying on the work, all suspicion of "cliquism" would speedily disappear; and therefore he hoped that before the time for the next meeting, the hands of the Honorary Secretary and Committee would be strengthened by promises of papers from some who had not been heard at the meetings before.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Gentlemen,—It is with very great pleasure that I welcome the South-West Association of Gas Managers to Bridgwater, accepting your visit as an unexpected compliment to myself and also to the Company in whose employ I have spent nearly 30 years of my time. Amidst the multifarious duties which devolve upon the Manager of a small provincial gas-works, I have not attempted to prepare an address of the nature and extent of many of my predecessors, but have contented myself with a few common-place words founded on local experience. Possibly the remarks I am about to make will savour too much of the personal to be of general interest; but, in this and all other matters pertaining to the office to which you have so kindly elected me, I trust you will accord me a large measure of indulgence.

Whatever success has attended my labours during my long period of service in this Company, is largely due to the business treatment by my Directors of all matters brought under their notice; the confidence they have reposed in their Manager; and their proper appreciation of his services. The condition of this undertaking has considerably improved during the period of time referred to. The number of meters has increased from 409 to 1096; the public lamps, from 138 to 271; the annual make of gas, from 9½ million cubic feet to 42 millions; and the price of gas has been reduced from 6s. 6d. to 3s. per 1000 cubic feet. The unaccounted-for gas has been brought down from 18 per cent. to 8½ per cent.

The condition of the works when I entered them may be gathered from the following details. The original gasholder was in a most deplorable condition; being too large for the tank. It was suspended at three points; but the space between the holder and the tank was so contracted that there was no room for guide-rollers, and consequently it surged about like a ship in distress. Sometimes in descending it would catch in the side of the irregularly shaped tank; and if not promptly assisted by hand spikes or by loading the crown with bricks (which were always kept near at hand for the purpose), the town lights would be rather interfered with, and occasionally extinguished. The tank of this holder was a receptacle for waste tar and ammoniacal liquor; the water becoming so strong as to be in demand by an artificial manure manufacturer. The purifiers, too, were small and troublesome. In the winter months we usually emptied two daily, and sometimes three; and occasionally this operation had to be repeated on Sundays. All this has now been changed; and very little of the original plant and buildings remains. Our plant now in some respects is quite equal to present and prospective needs, and other additions are in contemplation; but the present times are not deemed favourable for making larger outlays than are found to be really urgent or indispensable.

Like many other provincial towns, our population is but slowly increasing; and having previously occupied all the district open to the Company, we are not progressing so rapidly as heretofore—in fact we are nearly at a standstill so far as the number of our customers goes. In addition to this, the use of gas is retarded by the facilities offered for obtaining a cheap and good light by means of oil; the outlay for lamps, too, being so trifling as to place the introduction of gas into new premises at a serious disadvantage. How to combat successfully with this powerful competitor, is the question of the hour—whether by the loan of gas-fittings at a low rental, by monthly payments, or by prepayment meters, when they are made to be reliable. One of the effects of standing still—or worse, of retrogression (which, I regret to learn, is the case with many provincial companies)—is that it prevents the periodical reduction of the price of gas, consequent upon an increase of business. This is a matter of great regret, as it is of most consequence to the consumer, whether the Company is supplying him under the Gas-Works Clauses Act, the sliding scale, or, as in the case of this Company, without statutory interference.

Another hindrance to reduction of the charge for gas, affecting large and small concerns proportionately, is the fall in the market value of tar and sulphate of ammonia; making a difference in profits equal to 3d. per 1000 cubic feet. It is satisfactory to observe a steady rise in the price now quoted for these articles. Whether we shall again touch nearly 3d. per gallon for tar, and £20 per ton for sulphate of ammonia is very doubtful, and, for some reasons, undesirable. Abnormal values, whether in purchasing or realizing, in a business of this nature, are to be deprecated; but being creatures of circumstance, and subject to the ups and downs of markets, we must submit to the inevitable, and, if possible, counteract their inequalities by an elasticity in the method of arranging our accounts. I note here that, whilst the values of our secondary products are improving, the price of the raw material—coal—is increasing, and, to all appearance, the rise will be a permanent and serious one.

As a Company, we are rather singular in the matter of credit. The bulk of our accounts are payable half-yearly; but we are gradually altering them to quarterly and, in a few instances, to monthly accounts. The latter system, although involving more trouble, is fast becoming a necessity. We have tried payment in advance; but the free and independent consumers in Bridgwater rebel against this innovation, and we now number only two such—the whereabouts of one of these being unknown.

I regret having no appliances of special interest on these works to call attention to, with perhaps the exception of a Dempster regenerator furnace, and a simple plan for clearing the air from freshly-charged purifiers. The furnace referred to is adapted to ordinary settings, and is no doubt an improvement on the usual ones, as we obtain an increased and more uniform temperature in our retorts, with a reduction in fuel; but I regret to say, being something new, it is not in great favour with the stokers. The air-clearing arrangement which I have recently introduced and applied with success to two new purifiers, each 25 by 20 feet, consists of a 2-inch wrought-iron pipe and cocks between the purifier-house and the retort-house. Gas under ordinary working pressure enters the top of the purifier through the outlet, and expels the air at the inlet through the 2-inch pipe into the foul main. In addition to a saving of from 2000 to 4000 cubic feet of gas at each change, the air intimately mixed with the gas in its passage through the foul main, condensers, scrubbers, and foul purifiers, has no doubt some effect in revivifying the oxide *in situ*. Care is necessary not to conduct the operation too rapidly, for well-known reasons. The quantity of gas passed to expel the air is regulated by meter to about 2 per cent. of the gas made.

Gentlemen, I do not forget that this is our twenty-third half-yearly meeting; and it is a matter for congratulation that the membership of this important Association is steadily increasing, and that one only of our number has this year gone over to the "great majority"—Mr. Mountford, of Andover, with whose sorrowing friends we offer our sincere sympathy. We have to-day the pleasure of welcoming seven new members; making our total strength 79. A glance at the map prepared by our Honorary Secretary shows the wide extent of the district embraced by this Association; and as there are yet some centres of light within that area not yet represented here, I hope the gentlemen filling these important positions will soon unite with us and discover, to their personal satisfaction, that "union is strength." This Association having carved out for itself a distinguished position among the District Associations of our country, I sincerely trust it will be the aim of each member to assist in maintaining and, if possible, in increasing its status, by attending its meetings, reading practical papers, taking part in the discussions, and making known its benefits to friends, so as to enlist their co-operation.

From the most reliable sources of information, it is gratifying to find that our particular and important industry is making steady progress. The cry "Light, light, more light" is heard in every direction—from the mansion to the cottage, from the broad and busy thoroughfare to the silent dark and crime-stained alleys of our towns and cities. The question is, Who will meet the demand—the costly and erratic electric light, the handy, but dangerous and dirty oil, or the cheap, safe, clean, reliable, good, and honest 16-candle coal gas? The answer in a great measure is in our own hands. For the present and near future, we believe gas interests are quite secure against all comers. This being so, we are content to refer all talk of annihilation to the generations following. At the same time, to manifest apathy or indifference in the face of such formidable competitors as are now in the field would be folly or worse.

The subjects suggested by Mr. Jervis for discussion at the present meeting are:—(1) To what extent are the advantages claimed for separate sections of hydraulic main realized? (2) The testimony of users of anti-dip valves. (3) Scoop charging. (4) Scurfing retorts. Of these we propose to take the first two, reserving the others for a future occasion; and I trust the members present who have had experience in any of these matters will give us the benefit thereof. Mr. Jervis kindly promised to collect information on the first question; and I will now call on him to fulfil that promise.

Mr. H. Sainsbury (Trowbridge) said that, before the reading of papers was proceeded with, he had a pleasant duty to perform, and that was to propose a hearty vote of thanks to the President for the excellent address which they had just heard. Those who had passed the presidential chair would probably agree with him that the work of preparing the Inaugural Address was a task attended with some trouble, and looked forward to with some anxiety. He was sure that the words that had fallen from their friend as to the cry of "Light, more light" would sink into the mind of all present; and was certain all would wish to thank the President heartily for his address.

Mr. Durkin expressed his pleasure in seconding the proposition, which he was in a position to do sympathetically, having twice passed the chair. The task of preparing these addresses was one of increasing difficulty. In the early days of the Association, it was simply taking up a new thing; but now there were Inaugural Addresses from one end of the land to the other, and it was a troublesome matter to find something new or original to say. He had been very interested in hearing of the rise and progress of the gas industry in Bridgwater.

The motion was carried with applause.

The President desired to thank one and all for the kind manner in which his address (which he felt was scarcely worthy of the complimentary remarks made by the proposer and seconder of the proposition) had been received.

Mr. J. J. Jervis then read his paper as follows:—

TO WHAT EXTENT ARE THE ADVANTAGES CLAIMED FOR SEPARATE SECTIONS OF HYDRAULIC MAIN REALIZED IN PRACTICE?

When I undertook to write a short paper on the above subject, I was perfectly aware I was unable to do so from my own experience; but I thought I could get ample information from the managers of works where sectional hydraulics are in use. I find, however, that either very few works have at present adopted the practice, or the managers do not altogether like to reply to an inquiry. Perhaps had I visited the several works, instead of writing, I should have gathered more information; and I admit that it may certainly be troublesome for a busy man to sit down and answer a long string of questions. However, I received many kind replies, and sufficient information to say something on the subject; and if thereby a text be furnished for discussion, I shall not have made the mistake I was afraid I had, when I read in one reply—"Is it not rather difficult and somewhat unusual to write a paper on a subject in which the writer has had no special experience? But perhaps your Association is testing some new method for the production of good discussion?"

I wrote to the managers of a great many works, large and small; and all outside our Association, as I did not wish to deprive any member present from giving us the benefit of his experience. I asked for information under the following questions:—(1) Do you find in the separate system a remedy for choked ascensions? (2) How often are the contents of the hydraulic run out? (3) Do you work without a seal, or how much? (4) Do you find less carbon deposit? (5) Had you, before introducing the system, ever been seriously inconvenienced by requiring isolation of any particular bed of retorts?

From the replies which came to hand I learn that, in the matter of chokes as caused by the hydraulic, there are still divers opinions. Two or three managers could not, as the result of their experience, say that the separate system either lessened, or was a remedy for "chokes," as they had not known stopped ascensions for ten, twelve, and fifteen years, in which periods they had tried both systems. One gentleman replied to the effect that separate sections facilitated the cleaning out of the mains; and although they did not do away entirely with stoppages, these were certainly lessened in number. But several other managers said they found no benefit whatever from them in this respect. Therefore, although the separate system allows of frequent cleansing of the hydraulic, it seems pretty clear that the cause of stoppages is not entirely due to the long main and thick tar, and that the decrease of the number of stopped pipes by the use of separate sections, may be due to other existing conditions, rather than to the periodical cleansing of the hydraulic; for some managers who run out the contents of the main either partially or wholly every day state that chokes occur as formerly. Two of those who replied admitted that, although they had the separate system in use, they only run off the contents of the mains once or twice a year. Of course, they cannot complain if they find stopped ascensions are not less frequent. One manager said he flushes out the hydraulic every few days with cold ammoniacal liquor; another, with warm. One, sometimes allowed the contents to run clear out; and then let the main fill up with tar and liquor as made—working all the time without seal.

As a rule, however, all the replies I received show that users of the separate system do not work with less seal than those who have long lengths of main; although, by frequent flushing and running out, they have a cleaner liquid in the hydraulic. But, as before noted, that does not appear to diminish the carbon deposit to any great extent, any more than it does stoppages. Those who had no stopped ascensions had (in my opinion, from the same cause) little or no carbon; and this is not on account of anything in the hydraulic or seal, but because of something special in the heats or coal; or perhaps from another reason which will be alluded to further on. The manager who works sometimes without a seal at all, running his exhauster just on the balance, does not find the deposit of carbon less; and, from the answers as a whole, I gather that, although the separate system facilitates a lighter dip, and in some cases no dip at all, it does not any more than the various anti-dips in use remove sufficient pressure to occasion any appreciable diminution of carbon deposit. At one or two works from which I have received information, the hydraulic is divided by diaphragms between the flanges of each section, with a gas passage at the top of the plate, and arranged so that the contents of any portion can be run off, either partially or wholly—the tar being taken off first. This plan is not so costly and complicated as the absolutely separate main system; but it has not the advantage of the extra gas exits.

The answers to my last question were better in accord with each other, and showed a more clearly-defined reason for adopting the use of sectional hydraulics. It does not appear that the system has been introduced because any inconvenience has arisen, requiring isolation of any particular bed of retorts, from accident or otherwise; nor as a decided and unfailing means of preventing chokes or carbon deposits; but as a remedy against the unequal sealing that takes place in long lengths of hydraulic supported in the orthodox fashion—on standards or crutches on the ever-shifting brickwork of the retort stack. One engineer observes that "care in building the arches, and in supporting the hydraulic main, does a great deal to remedy the inconvenience that gives rise to such isolation." Another says that "the great advantage of the division is that you are able to keep a regular dip with the several adjustable overflow valves." Another affirms that "now he has no trouble with the seals as formerly." And, in the same strain, another adds that having suffered much by the expansion and contraction in the slack, causing breakage of joints, leakage, &c., and unequal seal, he often desired the sectional arrangement, as at once preventing such occurrences. One answer gives what appears to me to be the main advantage of the divided hydraulic, though perhaps not the recognized reason why some have adopted it. The writer, an engineer of a very large works, says: "I have never thought it necessary to carry the separate system out to the extreme extent to which it is carried by some engineers; but I have generally taken the gas off at many different places, or, roughly speaking, one lead-off pipe for every ten or twelve retorts." Now, taking the gas off at many different places may be the secret after all of not so many chokes and less carbon with a divided hydraulic. An esteemed member of this Association maintains that ample exit for the gas will diminish stoppages; for, in the discussion on the question at our meeting last March, at Trowbridge, he remarked that "it was all very well to talk about large ascension pipes; but this was not going far enough. There must be large exits from the hydraulic. With some free working coals, the gas came off with great rapidity at first; and there should be nothing to hinder it from freely passing away. He found the coal had nothing to do with it; and the cause was certainly not high heats. The simple fact was that the outlet from the hydraulic was too small; and when this was set right, there were no choked pipes." The extreme sectional hydraulic gives a "take-off" both for gas and liquor to each bed of retorts; but it may be questionable if the division need be so great. As to adopting the separate system because of the unequal standing of the main on the retort-stack, I prefer the placing of it on columns, and altogether independent of the brickwork.

In conclusion, I hope I have furnished text for some discussion; and then I shall be satisfied I have not made a mistake in writing a short paper on a subject in which I have had no special experience.

Discussion.

Mr. R. Beynon (Torquay) said he had lately tried dividing the hydraulic main into short sections. When he first went to Torquay there were three benches of retorts, and one length of hydraulic to each bench. Owing to expansion and contraction of the brickwork when lighting up or letting down at different parts of the bench, the seal would vary from 1½ inches at one part to 4 inches at another; and choked ascension-pipes were a frequent occurrence. In the summer he took the top plate off the hydraulics, fitted a diaphragm plate between each flange, and arranged a separate outlet for each section. This arrangement proved serviceable in reducing the stoppages in the ascension-pipes, and also the deposit of carbon in the retorts. The carbon, which formerly accumulated in great blocks at the back ends, was now more evenly diffused throughout the retort, and formed much less rapidly. The plan of separate sections had, therefore, proved a great relief to him.

Mr. S. W. Durkin (Southampton) remarked that he had not hitherto tried short lengths of hydraulic; and in one of his retort-houses, there was one length for every eight benches. As a matter of experiment, he had lately fitted up in one house, in addition to the outlets, of which there was one at each end, wrought-iron 2-inch outlets at frequent intervals, so as to take the gas off rapidly, and without passing along any very great extent of main. In another house there was one length of hydraulic to every four benches, fitted with an outlet at each end; and he had as much trouble from choked pipes with this arrangement as in the house where the longer length of main was used. He was, therefore, unable to speak from experience as to the benefit of dividing the hydraulic, though, under some circumstances, such a plan might be advantageous. The long lengths of hydraulic required levelling occasionally, or else the anti-dip system might obtain without the apparatus. He periodically had this carefully attended to, propping up the main when necessary. In speaking of choked pipes, he thought it was desirable to specify whether the ascensions or the bridge-pipes were the parts referred to, as there was some difference in the nature of the deposit, which was usually harder and more pitchy in the ascension-pipe. Indeed, he had seen it so hard that the pipes were split by the "jumper."

Mr. W. A. Padfield (Exeter) said he had both long and short lengths of hydraulic at his works. At one part of the carbonizing system, there was one section of hydraulic to each bench, fitted with a separate outlet leading to a foul main common to all. Formerly, he experienced great trouble from choked pipes; but since adopting this plan he only had one occasionally. Another advantage was that the exhaust could be increased a little; and this, he thought, had been the means of reducing the carbon deposit on the retorts. Whatever the amount of exhaust, however, that was not everything, though the freer the exit for the gas, the better. In regard to the long lengths of hydraulic, there was rather more carbon in the retorts, because of the variable depth of tar in the main; and this meant variation in back pressure. But if the level of the long lengths was carefully attended to, he obtained as good results as with short lengths. One advantage in connection with the latter that might not at first sight appear, was that the exhauster was working on only the number of dip-pipes that were actually in use; and therefore the risk of drawing air was done away with.

Mr. H. Sainsbury (Trowbridge) said that at one time he had a row of eight beds of retorts with one length of hydraulic for the whole; and he experienced considerable difficulty on account of the variations in the level producing unequal dips, to which allusion had already been made. But he had gradually been arranging the beds in shorter sections; and now had four lengths of hydraulic main to thirteen beds of retorts, fitted with tar-valves to take off the tar as fast as it was formed. The result was that he could decrease the seal, and keep up a good exhaust; and yet he scarcely ever heard air drawing in through the dip when a retort was slacked off. His experience showed that it was possible to work with more certainty with the short lengths of hydraulic.

Mr. J. Lowe (Weymouth) remarked that he had used separate sections of hydraulic to each bed of retorts for some time, but could not say that he had realized all the advantages claimed for the plan. The greatest benefit, in his experience, was the facility afforded for cleaning the hydraulics or removing the dips, without interfering with regular operations. He had large outlets, 6 inches in diameter, for each section; but he did not think that went for much. During his recent illness, his nephew and late foreman were much troubled with choked ascensions and bridge-pipes, which he found usually went together. He used beds of sixes; and it was only with the two top retorts in each setting that the trouble arose. They hit upon the simple expedient of increasing the length of the ascension-pipes to those retorts, to the extent of 3 feet; and this proved a complete cure. He considered that the nature of the coal used had more to do with trouble from chokes and stoppages than anything else.

Mr. H. G. Crowe (Wellington) said he was sure there was some advantage in having a separate section of hydraulic to each bed of retorts in small works. The advantage was especially apparent when only a comparatively small number of the whole were in use, as the exhauster was only acting upon the dip-pipes that were actually at work, and there was no chance of drawing air. He could keep up a nicely regulated dip; and the men liked the arrangement. At Wellington there were five beds of retorts; and it was never necessary to keep them all going at one time. When there was one length of hydraulic for the five beds, it was difficult to preserve an exact level; and, indeed, the expansion of the brickwork on one occasion was sufficient to cause a fracture of the hydraulic, which might have led to a serious mishap.

The President thought that scarcely any two speakers agreed upon some decisive advantage that might be secured by dividing the hydraulic main into sections—one for each bed. But there was no question that the consequences of a deviation—say, of an inch—in the hydraulic seal were of sufficient importance to render it advisable to obviate it if possible. He had experienced a difference of this kind on a length of hydraulic that served for five beds of fours. The seal was ¼ inch at one end, and gradually increased to 1½ inches at the other; and he had known the joints to open when lighting up at one end. As to stopped pipes, he used coal that did not admit of very high heats, and scarcely knew what a stoppage in the ascension-pipes was; but he had found a considerable amount of tar in the H pipes. He gathered that there was a difference of opinion as to the advantages to be secured by separate sections of hydraulics; and some thought that they could be obtained, in a great measure, by careful attention to the working. The plan certainly involved some outlay. Outlets for the gas at frequent intervals prevented all the gas from travelling in the same direction, and did not admit

of its remaining so long in the hydraulic; but, though more valves might be required, they need not be so large. A valve for a single bed need not be so large as one for (say) three beds. It seemed to be understood that the freer the gas could pass off, the less would be the formation of carbon in the retort; and therefore it might prove advantageous to fix several gas outlets on a long length of hydraulic. But if anything at all was done, it would be better to have separate sections of hydraulic to each bed. On long lengths of hydraulic, there was certainly a liability to strain and fracture; and uniformity of seal was an important point, as was also the confining of the exhauster action to the beds actually in use.

The paper read by Mr. H. Sainsbury, of Trowbridge, entitled "Scurfing Retorts," with the discussion thereon, and the paper by Mr. J. Thomas, of Bodmin, on "Tar Firing," will be given in the next issue of the JOURNAL.

MR. LEVER AND THE LEEDS GAS COMMITTEE.—At the meeting of the Leeds Corporation Gas Committee last Thursday, it was stated that since the last meeting of the Council two letters had been received from Mr. Ellis Lever, in the latter of which he intimated his intention to break off correspondence with the Committee on the subject of the coal contracts.

STATION METERS IN CONCRETE TANKS.—Messrs. W. Parkinson and Co. have just received an order from the South Metropolitan Gas Company for another large station-meter drum, of 1500 cubic feet capacity, for inserting in a concrete tank. The drum is constructed on their patent three-partition system, and is the fourth on this plan supplied to the Company. The construction of these concrete tanks and drums was fully described in the JOURNAL, Vol. XLIII., p. 574.

THE NEW RAILWAY RATES FOR MERCHANDISE.—In reference to the remarks made by the President at the meeting of the Eastern Counties Association last Wednesday on the subject of the proposed new railway rates for the conveyance of coal, &c. (as reported in another column), we may state that it has now been definitely announced that the Board of Trade have extended the period within which objections may be lodged against the proposed rates and classifications of the railway companies under the provisions of the Railway and Canal Traffic Act, 1888, from the 9th prox. till the 3rd of June. The *Standard* says that the members of Parliament who have interested themselves in this question are generally satisfied with the extension of time granted; and it is believed that the number of objections sent in will be enormous.

THE LIGHTING OF THE HOUSES OF PARLIAMENT.—The addition of the electric light to the arrangements of the House of Commons has, says the *Daily News*, by some unaccountable process increased rather than decreased the expenses for gas. Last year the gas bill was £3300, whilst the cost of the supply for the coming year is estimated at £4000. This is in addition to an increase in the expenditure of £40 on electricity. The supply of oil-lamps in the Houses of Parliament still maintains its immense proportions. This year, as last, not less than £2000 is paid for oil for the lamps, which are used only in the committee-rooms, some of the lobbies, one of the reporters' rooms, in the ventilation department, and in the residences of officials. The total cost for warming, ventilating, and lighting the Houses of Parliament in the coming year is estimated at £16,100, against £14,520 last year.

THE SOCIETY OF ARTS MOTOR TRIALS.—At the Society of Arts last Wednesday, Professor Kennedy, F.R.S., read an interesting paper on "The Objects and Methods of the Society of Arts Motor Trials." The author, it will be remembered, on the invitation of the Society, carried out, in conjunction with Dr. Hopkinson and Mr. Beauchamp Tower, an exhaustive series of experiments with motors suited for electric lighting purposes; and an abstract of the Judges' report was given in the JOURNAL for the 12th inst. This document has been published *in extenso* by the Society; but the Council thought that some more detailed statement of the objects as well as of the methods and results of the motor trials, in a form which would be useful and intelligible alike to lay and professionable readers, would be desirable. They therefore asked Professor Kennedy to prepare such a statement in the form of a paper. This he did, with the happiest results; his paper being perfectly understandable from beginning to end, by the non-technical listener. Discussion of the subject was postponed till to-morrow, when Sir. F. Bramwell will preside. Sir F. Abel, C.B., proposed a vote of thanks to Professor Kennedy; and, in doing so, emphasized the importance of the work which he and his colleagues had carried out. Mr. W. Anderson, M. Inst. C.E., in seconding the proposition, testified to the thoroughness and absolute trustworthiness of the trials, which were, he believed, as far as gas-engines were concerned, the first which had been undertaken with no other object than to ascertain the truth. The Chairman (the Duke of Abercorn, C.B., Chairman of the Council) then presented one of the Society's gold medals to each of the competing firms—viz., The British Gas-Engine and Engineering Company, for a 6-horse power Atkinson "Cycle" gas-engine; Messrs. Crossley Bros., Limited, for a 9-horse power "Otto" gas-engine; Messrs. Dick, Kerr, and Co., for an 8-horse power "Griffin" gas-engine; Messrs. Davey, Paxman, and Co., for an 8-horse power compound portable steam-engine.

Correspondence.

[We are not responsible for the opinions expressed by Correspondents.]

THE DINSMORE GAS PROCESS.

SIR,—Mr. Dinsmore, seemingly to avoid the effect of a direct answer to my letter in your issue for the 12th inst., has allowed Mr. Isaac Carr to enter the breach; thinking, perhaps, that on my observing a friend there, I might withhold further criticism. Whatever my own desire may be, I fear others will be less merciful; and I have no course open but to reply.

Mr. Carr says: "It may be that the previously obtained specific gravities are not absolutely reliable." The reply to this is unanswerable—viz., that the specific gravities of gases are too well known to admit of doubt, and are above dispute; further, they are easily demonstrable by every intelligent gas manager for himself. And here the question naturally arises, "What is the specific gravity of the Dinsmore gas?" Will Mr. Carr tell us, so that we may compare it, and find out the difference, if any, between that and gas of the same illuminating power made by the ordinary process?

Again, Mr. Carr says: "The presence of a quantity of acetylene will account for the increased illuminating power, without giving the additional weight." But here again acetylene gas is one of the very heaviest in the hydrocarbon series; and therefore, if present in larger quantities than usual, would proportionately increase the gravity of the gas. Hence, Mr. Carr proves that increased light means increased weight.

Mr. Carr does not seem to realize the full significance of the figures given in my letter. If you will allow me, therefore, I will restate them in a rather different form—

12,500 cubic feet of 22-candle gas weighs	513 lbs.
10,500 cubic feet of 16-candle gas weighs	366 „
Difference	147 lbs.

Mr. Carr does not give the weight of tar drawn from the duct. I therefore give him the impossible benefit of gasifying three-fifths of the 7 gallons of tar originally weighing 80 lbs.—that is to say, if 48 lbs. of the 80 lbs. is gasified after going through the process of distillation, it seemingly produces a weight of 147 lbs.

In conclusion, I may call attention to page 34 of Lunge's "Treatise on the Distillation of Coal Tar," where I find these words: "Acetylene itself ($C_2 H_2$) is a gas, and can only be dissolved in very small quantities in tar."

Ramsgate, March 20, 1889. WILLIAM A. VALON.

SIR,—Mr. Isaac Carr makes some very vague statements in his answer to Mr. Valon's figures. He says that the presence of a quantity of acetylene will account for the increase in illuminating power without increasing the weight. I do not see how this can be when acetylene and olefiant gas are nearly as heavy as air; and therefore any increase in illuminating power must be attended by a corresponding increase of weight. Mr. Carr, in effect, says that he can get great increase of illuminating power without increase of weight. This seems rather absurd. The following figures prove that 7 gallons of tar will not produce enough to account for the increased make of even 16-candle gas, without taking into account the increase in illuminating power from 16 to 20 candles:—

Weight of 12,500 cubic feet of 16-candle gas . .	435·7 lbs.
„ 10,500 „ „ „ . .	366·0 „
Increase due to gas from tar . .	69·7 lbs.
Estimated weight of coke left in duct	27·0 „
Weight produced by 80 lbs. of tar	96·7 lbs.
	80·0 „
	16·7 lbs.

Where does this 16·7 lbs. come from?

Ramsgate, March 20, 1889. WILLIAM G. HICKS.

THE SCURFING OF RETORTS.

SIR,—Will you kindly allow me space in your columns to inform "Country Manager," whose letter appeared in last week's JOURNAL, that I adopted the principle he so briefly describes about four years since; but instead of employing sanitary pipes I use 3-inch wrought-iron steam tube, which answers the purpose without any fear of breakage. I get it from the makers in 4-feet lengths, screwed at both ends, with a socket on one end. Through time, the end that goes into the retort and is subjected to the heavy heat, becomes eaten away. Then all that is necessary is to add another 4-feet length. This, however, does not happen very often, as the pipe is only made a few inches shorter after each application. Instead of walling up the mouthpiece with bricks (which I consider detrimental on account of the joints cracking and admitting air, which is against the principle), I procure an old cover, cut a piece out of the bottom to admit the pipe, lute the cover, put it on, and all that is needed is to point round the hole with a little fire-clay. Care must be taken to see that the hole in the top of the ascension-pipe is larger in diameter than the pipe that is used, so as to allow the expanded air to freely escape; thus getting quick circulation. When the carbon leaves the retort, the current draws a little air through the cracks therein. This is another reason why the hole should be larger. If there are any very extensive cracks, and the carbon is all eaten away, the principle will not apply. There will be plenty of draught up the ascension-pipe, but none up the pipe in the retort.

I think "Country Manager's" joints in the sanitary pipes or else the hole in the top of the ascension-pipe is too small, or he would not be two days in removing the carbon. I have some retorts that have been in use three years and a half. They are as free from carbon as they were when new; and if my arrangement stands from eight to nine hours, I find it long enough after the retorts have been in use from three to four months.

I have adopted my plan to clean out ascension-pipes as well as scurfing retorts, and it answers with equal satisfaction. At the same time I have steam, but never use it for the above-named purpose.

March 23, 1889. COAL GAS.

GASHOLDER CUPS.

Sir,—There are a few statements in a letter upon the above subject, from "Engineer and Contractor," in your last issue, which I think should not be allowed to go unchallenged.

"Naturally," as he says, "this resolves itself into a question of the thickness or substance of the iron used." Just so; and will not the "round cup and dip" with a thickness of from $\frac{5}{16}$-inch to $\frac{1}{2}$-inch up to and above the water-line in the cup, be better able to withstand corrosion than the "square form," with side sheets of only $\frac{1}{2}$-inch or $\frac{5}{16}$-inch at the same point?

Is the strain in the dip carriages vertical? Certainly not. Where, then, is the advantage of the broad flat base? Will not the bolts in the square shape be most likely to have all the strain, as the strain and resistance thereto form a couple? In the round form, through the carriage being both on the top and at the sides of the dip, there will always be some portion in a direct line with the strain—that is, the direction of the strain will always be normal to some point of contact between the carriage and the cup or dip; therefore relieving the bolts. Again, the round cup allows the roller to be kept nearer to its work, or a larger roller to be used, instead of the carriages being carried up a great height above the dip for the rollers to clear.

Then as to the "little bit" theory. The round cup or dip has, he says, 117 "little bits" in the circumference; what will the square cup or dip have? Let us see—

Channel irons	16	pieces
Joint covers to ditto	16	,,
Plate forming the hydraulic seal	48	,,
Plate forming the bottom row of the sides of the holder, to which the channel iron is riveted (at least)	117	,,
Total	197	pieces

or about 70 per cent. more "little bits," leaving out of the question the bead iron in both cases, although there is none put upon the round form in some of the finest examples of gasholder engineering extant.

Need I inform "Engineer and Contractor":—

1st. That the price of *English* channel iron is now about £2 per ton above that of plates. Nearly as great a difference as he mentions. It is only cheap foreign "*stuff*" that can be purchased at the price he infers.

2nd. That gasholders are never built without a large amount of blocking and propping.

3rd. That a round cup or dip is not sent away in small pieces, but riveted in lengths of from 16 to 20 feet. Therefore no more props are required than for a square cup or dip.

4th. That a channel-iron bar, when curved, has to be bent to a smaller radius than it is intended to finally assume, as it always will straighten itself to a certain extent in cooling and when being riveted to the plates.

5th. That the more riveted joints there are in a structure, the greater chance of leakage there is. In a square cup or dip there is 50 to 200 per cent. more riveting to be done than in the round form, depending to a large degree on the skill of the designer.

May I also say that I have never known a case of a bent cup being replaced before the side sheets of a holder; but I have often seen the sheets attached to the channel-iron cup and dip renewed through excessive corrosion at the water line?

I cannot imagine that the plea of rigidity can be upheld, as a tubular distribution of material of equal thickness is admittedly the best; and a round dip or cup can be made for 10 per cent. less in first cost than a square one.

Altogether, Sir, it is evident that "Engineer and Contractor" does not know how to make a round cup or dip; and his letter shows the same special pleading as was used in the description of the Sydney gasholder, which was so fully exposed in your article afterwards, and subsequently in the letter of Mr. George Livesey. Square cups and dips are only now made and designed by engineers and contractors who have been left behind in the modern march of improvement.

March 23, 1889. DESIGNER.

COUNTY AUTHORITIES AND THE LAYING OF MAINS ON BRIDGES.

Sir,—I shall be exceedingly obliged if any of your readers can give me advice under the following peculiar circumstances:—Over a river in this Company's district there is a certain bridge, constructed and maintained at the expense of the County. The bridge was erected about twelve years ago in place of an older structure. The local Gas and Water Company had over the old bridge a 5-inch water-main, which was in due course placed on the new bridge, and afterwards a 7-inch gas-main was also laid. About a year ago this bridge failed, and was closed on account of being dangerous; a temporary bridge being put up in its place. Prior to the bridge being condemned, the 5-inch water-main had been removed, and a 10-inch pipe substituted for it. The latter was laid on the temporary bridge, whilst the gas-main was cut off at either end until such time as a new bridge could be constructed. The county authority has refused to pay the expense of the removal or alterations to either the gas or the water main, or any part of such cost. The condemned bridge was a stone arch structure, with ample cover for the mains, and did not fail owing to any defect in the latter. The authority has now constructed a new bridge in place of the one condemned; and being formed of wrought-iron lattice girders, camber plates, and T-irons, is so shallow that there is not sufficient cover for the gas and water mains. The Gas and Water Company, on the completion of the new bridge (which is on the site of the condemned structure), and before the metalling was laid, replaced both mains on the surface. The County Surveyor, on visiting the work, complained that the mains had been placed thereon without the permission of the authority having been obtained or requested; and he required them to be removed from the surface, and both carried underneath the bridge, suspended by hangers. The Surveyor was aware these mains had been laid on the condemned structure.

My question is this: Has the County Surveyor power to require that the two mains, or either of them, shall be carried underneath the new bridge, instead of over as previously; bearing in mind that no special provision had been made, or notice given to the Gas and Water Company that they would be required to place the mains in the position indicated by the Surveyor? My apology for troubling you with this letter is that, as far as I can ascertain, no provision dealing with such a case appears in any of the Acts relating to gas and water which I have consulted.

March 21, 1889. DYM CYMRAEG Y GAEL.

MR. DENNY LANE ON ELECTRIC LIGHTING MATTERS.—The following postscript to the letter by Mr. Denny Lane, which appeared in the JOURNAL last week, reached us too late to be given with that communication:—"Since writing in reference to the profits of the Brush Company, I see that the shareholders have wisely resolved not to declare any dividend; leaving their profit in abeyance pending the very heavy litigation in which they are engaged. I did not mention that the Cheltenham Committee calculate on 1500 hours per annum as the average burning of incandescent lamps. The *Electrician* says the hours in America are only from 700 to 800; while at Leamington—a town well comparable to Cheltenham—the hours do not reach 500."

Parliamentary Intelligence.

HOUSE OF LORDS.

THURSDAY, MARCH 21.

The Examiners reported that the Standing Orders applicable to the Belgrano (Buenos Ayres) Gas Company Bill have not been complied with.

The Select Committee on the Bristol Water Bill reported that they had not proceeded with the consideration of the Bill; no parties having appeared in opposition thereto.

The Manchester Corporation Bill, the Newcastle and Gateshead Water Bill, the Windermere District Gas and Water Bill, and the Rastrick Water Bill were referred to a Select Committee, consisting of Lord Northington (Chairman), the Duke of Leeds, Earl Lauderdale, Lord Zouch of Haryngworth, and Lord Kinnaird; to meet on Monday, March 25.

During the past week the following progress was made:—

Bill read a second time: Cleveland Water Bill.

Bills committed: Barry and Cadoxton Gas and Water Bill, Eastbourne Water Bill, Plymouth Dock (Devonport) Water Bill, Rastrick Water Bill, Tuscan Gas Bill.

Bills reported: Deanhead Commissioners' Bill, Yeadon Water Bill.

Bill read the third time and passed: Hythe Corporation Bill.

Petitions against the following Bills were presented last week:—

Plymouth Dock (Devonport) Water Bill, from the Corporation of Plymouth.

Rastrick Water Bill, from the Rastrick Local Board and Owners and ratepayers of Rastrick.

HOUSE OF COMMONS.

TUESDAY, MARCH 19.

The Examiners reported that in the case of the Barrow Hæmatite Steel Company (Water) Bill, Standing Order No. 63 has been complied with.

The East Kent District Water Bill, the Kettering Water Bill, the Rickmansworth and Uxbridge Valley Water Bill, the South Kent Water Bill, and the West Ham Gas Bill were referred to a Select Committee, consisting of Sir Joseph Pease (Chairman), Mr. H. Elliot, Mr. Seton-Karr, and Mr. Tuite; to meet on Tuesday, March 26.

The Barrow Hæmatite Steel Company (Water), the Garw Water Bill, the Long Eaton and District Water Bill, and the Woodhall Spa Company Bill were referred to a Select Committee, consisting of Mr. Gurdon (Chairman), Mr. Winterbotham, Sir J. Swinburne, and Mr. Hozier; to meet on Thursday, March 28.

THURSDAY, MARCH 21.

The Examiners reported that in the case of the petition for the Belgrano (Buenos Ayres) Gas Company Bill the Standing Orders have not been complied with. The petition was referred to the Standing Orders Committee.

The Hythe Corporation Bill (Lords) was read the first time, and referred to the Examiners.

During the past week the following progress was made:—

Bills read a second time: London Hydraulic Power Company Bill, West Ham Gas Bill.

Petitions against the following Bills were presented last week:—

East Kent District Water Bill, from the Guardians of the Poor of the Eastry Union.

Heywood Corporation Bill, from the Corporation of Middleton.

Rickmansworth and Uxbridge Valley Water Bill, from the Uxbridge District Local Board.

OTTOMAN GAS COMPANY.—The report of the Directors of this Company to be presented at the half-yearly general meeting to-day states that the gas-rental for the six months ending Dec. 31 last amounted to £7605, and the net profit to £3065. The amount standing to the credit of the profit and loss account is £3597, out of which the Directors recommend a dividend at the rate of 7 per cent. per annum on both classes of shares, and that £500 be placed to the reserve fund. This will absorb £3125; leaving a balance of £472 to be carried forward.

GAS SUPPLY AT THE ANTIPODES.—The profits of the *Australian Gas Company* for the six months ending Dec. 31 last amounted to £50,903, out of which a dividend of 7½ per cent. was declared. This absorbed £46,499, and left a balance of £4404 to be carried forward. The Engineer, Mr. T. J. Bush, reports that the new gasholder at Mortlake (plans of which have recently been given in the JOURNAL) has been brought into use, and that the whole of the Company's plant is in good condition.——The amount standing to the credit of the profit and loss account of the *Brisbane Gas Company* for the half year ending Dec. 31 last was £13,082, which the Directors disposed of as follows:—To the reserve fund, £4331; dividend at the rate of 5 per cent. per annum, £1517; balance to be carried forward, £7234.——The *Armidale Gas Company* had for distribution, as the result of their working in the latter half of last year, £382, out of which they paid a dividend of 8 per cent. per annum, amounting to £320; added £50 to the reserve fund; and left £12 to be carried forward.——The *Wellington (N.Z.) Gas Company* made a profit of £7813 on their working last year, although there was a slight falling off in the consumption of gas; and they declared a dividend at the rate of 7½ per cent.—making, with the interim dividend of like amount, 15 per cent. for the year.

Miscellaneous News.

THE HALIFAX GAS SCANDAL.

Alderman Riley's Defence.

The following letter from Mr. Alderman Riley appeared in the issue of the *Halifax Courier* for Saturday last:—

Sir,—I have lain quietly aside for a very long time with respect to this matter, in the hope that the Special Committee appointed to inquire herein on the 4th day of July, 1888, would issue its report; but as it has not yet done so, nor do there appear any signs that it is about so to do, I think it is high time that the public heard something of the other side of the case.

The commencement of the so-called "Gas Scandal," was a letter received by the Town Clerk from Mr. Ellis Lever, dated the 23rd day of May, 1888, in which Mr. Lever asks for an appointment "to show how the Committee have been dealt with in the past." Mr. Lever on being asked by the Town Clerk what he meant to convey by the above insinuation, replied that he did not refer to any member of the Halifax Corporation, nor to any official thereof, "all of whom," he said, "are unknown to me."

Mr. Fox, in a letter to the Town Clerk, dated the 2nd day of June, 1888, says: "I am informed on very good authority that one man has an interest, directly or indirectly, in many of the contracts with the Gas Department of the Corporation of Halifax; and it would be well that this matter should be sifted to the bottom. Halifax cannot desire a repetition of the Salford Scandal."

On the 8th of June, 1888, Mr. Fox wrote to the Town Clerk, inquiring whether the Corporation had confirmed the contracts entered into by the Gas Committee, and said that, on receipt of a reply, he would again communicate with him. The Town Clerk replied to this letter by return of post; but notwithstanding this reply, and two further urgent letters written by the Town Clerk on the 18th and 21st of June, 1888, respectively, Mr. Fox does not give any reply, as promised by him in his letter of the 8th of June, 1888, until the 23rd day of June, 1888. By a letter dated the 26th day of June, 1888, Mr. Fox refuses to give any explanation of his letter of the 2nd of June, 1888, unless completely indemnified against all costs in the event of his charges being proved; and by a letter of the 28th of June, 1888, he declined to say whether he referred to any member or servant of the Halifax Corporation unless fully indemnified.

At a Council meeting held on the 4th day of July, 1888, I proposed a resolution, which was carried, appointing the Mayor, and Mr. Alderman Ramsden, and the Town Clerk as a Special Committee to enquire (*inter alia*) into this matter, and to report thereon to the Council. On this occasion, I said that everything which had come to the knowledge of the Gas Committee relating to this matter, had been laid before the Council; that this consisted of the letters above mentioned, and a small paragraph in the *Pall Mall Gazette;* that we always had persons amongst us who are so dishonest and corrupt as to be unable to believe in the honesty of others, and that consequently the insinuations contained in Mr. Lever's and Mr. Fox's letters, had been greatly exaggerated, and had grown into a grave scandal. On this occasion, too, I said, what I repeat to-day—viz., that if Mr. Fox, or any other person, would formulate any "direct" charge against any member of the Gas Committee, or against anyone connected therewith, then I for one, and I felt sure I could say the same for every other member of the Gas Committee, was fully prepared to meet and disprove the same.

At this meeting the Mayor spoke warmly, and in a manner worthy of admiration. Would that his subsequent speeches and conduct had been as estimable! Speaking on the charges herein, he said (and I hope this speech will be particularly noticed, and compared with his later ones on the same subject), "That that was a very unfortunate thing. It appeared that certain statements were made, and that there were people who were ready to amplify them, extend them, and rather than take the old English principle of considering a man innocent till proved to be guilty, they judged him guilty, treating him as being guilty, till he proved himself to be innocent. There was no other course for the Council to take than to prosecute that matter to its foundation; they must do that for their own sakes. Though the statements were so indefinite and intangible that it was difficult for them to say what was meant, still at the same time there were charges, and it was their duty to meet them. He had no fear whatever, judging from the way their gas-works had been managed, for he looked upon the gas-works as he would upon any other business—they must judge by the results. If there had been a regular system of peculation, or if a large amount of money had been abstracted, could the Halifax Corporation have produced its gas at a price lower than that charged in any other town in the country, or show such profit as they showed? Looking at the facts, looking at the results of their own work, such a charge, on the face of it, was a vile slander. Whatever the Council might do, he would take good care the matter was investigated, and if there was a possibility of warming these chaps, he would warm them either through their jackets or through their purses. These things should not be allowed to go on with impunity."

The small paragraph above referred to as having appeared in the *Pall Mall Gazette*, runs as follows:—"We should hear shortly of disclosures in Halifax, if the parties concerned dare to court inquiry;" but the Editor, on being asked by the Town Clerk whether the above allegations meant to impart a distinct charge of corruption against the Gas Committee of the Halifax Corporation, or their servants, or both, replied, "I am not prepared to become responsible for the construction which other persons or papers may have placed on a note published in the *Pall Mall Gazette*."

The opinion of Counsel was taken by the Corporation as to whether the above paragraph or the letters of Mr. Lever and of Mr. Fox were libellous; and the following is the copy of the opinion given by Mr. Wright, the Counsel consulted by the Corporation:—"I am of opinion that there is no sufficient ground for an action or other proceedings in either case. Lever's letter is not libellous. The *Pall Mall Gazette* note is libellous; but it cannot be shown to refer to the Corporation or to any particular members of it, or any particular officials, or to the officials as a body. I think that practically it is impossible to proceed with any effect. Fox's letter of the 2nd of June is also libellous; but the same difficulty occurs, and also the further and greater difficulty that the 'one man' cannot be identified, and that it does not even appear whether he is a member or servant of the Corporation. If Mr. Fox is worthy of attention, the only course would be to accept in terms his offers of the 26th and 28th of June, and challenge him to make good his statements or admit their falsity." Mr. Carr also took the opinion of Counsel as to whether the note in the *Pall Mall Gazette* gave him a cause of action against the paper for libel, and was advised that it did not. But, in spite of these clear and distinct opinions of both Counsel, at a Council meeting held on the 8th of September, 1888, the Special Committee, through the Mayor, advised the members of the Corporation not to proceed with the proposed indemnity asked for by Mr. Fox, for, as the Mayor said, they would thereby "be putting money into his pocket to go up and down the country, and in fact finding him ways and means to fight them with," but that the simplest course would be to call upon Mr. Carr to take action against the *Pall Mall Gazette*. The Mayor accordingly proposed that Mr. Carr should be required to sue the *Pall Mall Gazette* for libel, or, in the alternative, he should be asked to resign his position as Gas Manager. This resolution was ultimately passed, and on the 13th of September, 1888, Mr. Carr, through his Solicitors, acting on the advice of his Counsel, and in accordance with the above opinion of Mr. Wright, refused to commence proceedings against the *Pall Mall Gazette*, and tendered his resignation. Mr. Carr, however, offered to remain until his successor was appointed and well into harness, but was told by the Mayor that he could go at once, and that his services were no longer required. Through my intervention, however, it was arranged that Mr. Carr should stay until the end of the month; and his successor was appointed on the 9th of October, 1888. Mr. Carr, very properly having declined to commence proceedings against the *Pall Mall Gazette*, the Sub-Committee again turned its attention to the indemnity asked for by Mr. Fox; and at a Council meeting held on the 3rd of October, 1888, Mr. Alderman Ramsden proposed—"That the Deed of Indemnity now submitted between the Mayor and Mr. Thomas King Fox be approved, and the Mayor be authorized to execute the same on behalf of the Council, and that the Sub-Committee be requested to take all requisite steps in order to ensure a full investigation of the charges referred to." This motion was carried unanimously; and after the indemnity had been executed by the Mayor, Mr. Fox's charges, which were contained in a sealed envelope, were read. These charges ran as follows:—

1. "That William Carr, the Gas Manager, has received moneys by virtue of his position in relation to the Halifax Gas-Works, and has illegally appropriated the same to his own private purposes.
2. "That Emor Green Wrigley, of Ashton-under-Lyne, J.P., has fraudulently substituted another and inferior coal for that which he contracted to supply to Halifax and other gas-works.
3. "That Alderman J. T. Riley, J.P., is unfit to occupy the chairmanship of the Gas Committee of the Halifax Corporation.
4. "That the said William Carr, Emor Green Wrigley, and J. T. Riley, have been guilty of malpractices in connection with the Halifax Gas-Works."

At this meeting some very serious remarks were made by the Mayor. He said that he had knowledge in his possession that Mr. Carr had been bribed, and that to a considerable extent; and that he had no hesitation in saying that this could be proved up to the hilt. With respect to the contract for coal, he said that the Corporation had contracted for a certain class of coal, and had received thousands of tons of coal of an inferior quality, and that there was a difference of 2s. 6d. per ton in the price of the coal contracted for and that received. Moreover, he said, that this was not mere hearsay, but that in order to satisfy himself of the truth of this statement he had been to the colliery itself, and had seen the coal put into the trucks; and he assured the members of the Corporation that they had been contracting for a distinct class of coal, and that they had certainly received another kind. In addition to this, he gave it as his opinion that the Corporation had paid for a very great quantity of coal which had never been received. He also gave it as his opinion that when the Sub-Committee had had the opportunity of going more thoroughly into other contracts of a similar kind, they would be able to show that the Corporation had been paying from 1s. to 1s. 6d. per ton more for coal than the same could have been obtained from other sources. He further said that they hoped in a short time to have independent analyses made of the coal that had been used at the gas-works, so as to ascertain whether the best judgment had been exercised with regard to the purchase of coal, and whether the Corporation had been warranted in paying the prices given for the same.

At this meeting I simply said that I repeated what I had said in the Council Chamber two months before—viz., that I had never received a commission of a single sixpence, nor had I ever had one offered to me. And, moreover, that I should believe Mr. Carr to be innocent until the contrary was proved. With regard to the alleged difference in the quality of coal contracted for and that received, I said I knew nothing. But, I added, that if the Corporation had been defrauded or deceived, I too had, and that most grossly. I insisted on the whole matter being most fully gone into. I also said that I had visited the gas-works very frequently and that I had spent the best part of the last twelve years of my life in the interests of those works, and that, had I had thousands of pounds invested in them, I could not have taken a greater interest in them than I had done in the past.

At this meeting, too, the following resolution was passed:—"That Mr. Alderman Riley be called upon to commence a civil action against Thomas King Fox for the purpose of having the charges made against him fully investigated, and that in the event of his obtaining a verdict in his favour, he be indemnified against all costs, charges, and expenses incurred by him in such action."

In consequence of this resolution, I at once placed the matter in the hands of my Solicitor, and a draft indemnity was drawn up by Counsel, and submitted to the Town Clerk. By the terms of this indemnity, I bound myself to commence a civil action against Mr. Fox for libel within one week from the execution thereof, provided I was indemnified by the Corporation in the event of my obtaining a verdict against Mr. Fox, or unless I was proved guilty of receiving commissions or bribes on coal or other goods purchased by the Corporation.

The Town Clerk, in direct contrariety to the terms of the resolution of the Corporation above mentioned, so altered the terms of this draft indemnity as to provide that I should only be indemnified if I succeeded in obtaining a verdict for £10 or upwards against Mr. Fox on the vague charges made by him against me.

This I was advised not to accept, for, as my Solicitor pointed out in his letter to the Town Clerk, I might succeed in an action against Mr. Fox, and still have to pay my own costs if the jury were of opinion that I had not sustained damage to the extent of £10; and, as my Solicitor further pointed out in his letter, if Mr. Fox, in charging me with "malpractice," does not mean that I reaped some pecuniary benefit from my connection with the gas-works, then it is not incumbent upon me to disprove his charges. I do not mean to assert that during the whole of the twelve years which I have been Chairman of the Gas Committee, I have not been guilty of some slight acts of indiscretion, which may be termed "malpractices." So far as I am aware, these consist solely of the facts that I have purchased from the gas-works small quantities of tar and paint, and sulphate of ammonia, for use in my garden, and have on two or three occasions during the summer months employed one or two of the gas-works' labourers in and about my garden. But I did this unthinkingly, and, at the time, paid the full value for such goods and labour, and hold the Corporation official receipts for every ounce of anything which I have ever received from the gas-works, and for every moment of labour which has been done on my behalf. If this is what is meant by accusing me of being guilty of "malpractices," I admit the

truth of the charge. But this is not what the ratepayers have been given to understand as being meant by Mr. Fox's charge. And, again, surely if it is not worth Mr. Fox's while to state distinctly what his charges against me are, especially since he has received from the Corporation the sum of £100, it is not worth my while to compel him so to do. I can only repeat what I said at the very first stage of this matter, some eight or nine months ago, that if Mr. Fox or any other person, will, apart from privilege, openly charge me with having received commissions on coal, or any other goods, purchased by the Corporation, I have ever been and still am, without any indemnity, prepared to disprove the same; but no reasonable man can expect me to sue Mr. Fox on such vague and indefinite charges as those he makes against me. I say apart from privilege, because the Mayor, by virtue of his office, is privileged; and no action will lie against him unless it can be proved that he acted maliciously.

I solemnly repeat that I have never received a commission of a single sixpence on coal or any other article or commodity purchased by the Gas-Works or any other Committee of the Corporation of which I have been a member. Surely this is sufficiently clear for the comprehension of anybody; and I hereby undertake, if the Mayor, notwithstanding his startling remarks, will prove the contrary, to hand over the sum of £250 to the Halifax Infirmary, and the further sum of £250 to the Halifax Tradesmen's Benevolent Institution. The Halifax Infirmary is now in urgent need of funds, and no one can deny the great amount of good work that is being done by the Halifax Tradesmen's Benevolent Institution; so that I offer the Mayor the opportunity, if he can prove the truth of the conclusions which several people have come to in consequence of his remarks, of materially benefiting two noble causes.

At a meeting of the Burgessess of Ovenden Ward, held on the 15th day of October, 1888, the Mayor again repeated that the Corporation had received a different quality of coal from that contracted for, and that they had not received the quantity paid for. He further said that not one truck of coal in a hundred had been weighed; that the internal management of the gas-works had been loose and corrupt; and that, if a private concern had been managed on the same lines, the result would have been bankruptcy. How very different from his speech of the 4th day of July, 1888. He said, that the Corporation had agreed to idemnify Mr. Fox, and that his charges constituted a libel on the persons referred to. He further said that it was known that Mr. Carr would not fight; that Mr. Wrigley had written declining to do so; and that he believed that in the end none of the parties would fight. The question, he said, then arose as to whether the gas scandal was to quietly subside because the parties concerned would not take action. He thought that it should not. He said there were several resources open to the Corporation. In the first place, he proceeded, it would be the duty of the Corporation to sue Mr. Wrigley for the difference in the value of the coal he contracted for and that which he supplied. Another step, he said, would be to ask the Lord Chancellor to send down a Commissioner to examine people on oath, and go to the bottom of the whole thing.

Even at the opening of the new theatre, on the 27th of November last, the Mayor said he was convinced that there had been a gross swindle and robbery, and said that the public (and I suppose, too, Mr. Wilson Barrett) could rest assured that he should do his utmost to expose all of it. At a meeting of ratepayers held in the Drill Hall during the month of November, 1888, the Mayor, in reply to a vote of confidence in the Sub-Committee proposed by Mr. J. Seed, said that the Sub-Committee had gone heart and soul with him into the matter. He "could a tale unfold" which would rather astonish them. It was not, he continued, time then to speak out; but a time would come when he would be able to open his mouth, and tell them a great deal that had been going on, and a great deal that had not been exposed. There had, he said, been very great wrong-doing; and if it were possible to get to the very bottom of it, he could assure them that he and the other members of the Committee would do their utmost in the matter.

The said Mr. J. Seed, at the same meeting, proposed a vote of thanks to the Mayor for presiding; and, strange to say, he is the very person who occupied the chair at the meeting called by the discharged workmen at the Drill Hall last week, and then protested most strongly against the manner in which he said the ratepayers had been deceived by the Mayor in this matter.

So far as I am aware, the only active step taken by the Sub-Committee appointed to inquire into this matter has been the prosecution of the late Gas Manager with respect to the missing pages of the test-book. The circumstances attending his arrest, and of the execution of a search warrant at the offices of his Solicitors, and of the miserable collapse of the prosecution, are too well-known to need describing.

Since the appointment of the new Gas Manager, things have not gone on smoothly at the gas-works. The gas has been notoriously bad, and there has been great discontent amongst the workmen. The discontent reached its climax some few days ago, on the appointment of a Superintendent over the foremen, and the *employés* left the gas-works *en masse*. The consequences of this strike are well known. Great inconvenience has been suffered by everybody in the town—150 men have been thrown out of employment, great expense has been incurred, extra police have had to be brought into the town, the Gas-Works Committee have considered it necessary to pass a resolution that the Mayor should be provided with a police escort, and generally great danger has been run. As to whether or not the men are right in the course they have pursued, I say nothing, beyond that no such office as that occupied by Mr. Hoggard, at a salary of £130 per annum, ever existed under Mr. Carr's management; and that if such an office were found necessary, the intended appointment should have been advertised, and the foremen should have had a chance of applying for the post. I may, however, say that the old hands have given conclusive proof that they were fully competent to conduct the gas-works, for during the four months that Mr. Carr was away for the benefit of his health, there was the largest consumption of gas in Halifax on record; and yet the supply never ran short, nor there was a single hitch of any description.

That Mr. Carr was a good servant can easily be demonstrated. When he came to the gas-works, they were in a state of chaos; and gas was 4s. per 1000 cubic feet. When he left, the works were in first-class order, and gas was 1s. 9d. per 1000 cubic feet. In 1875, with a capital of £233,523 17s. 5d. invested in the works, the make was 264,038,000 cubic feet; whilst in 1887, with a capital of £290,744 15s. 4d., or about £53,000 more than in 1875, the make was £527,703,000 cubic feet, or practically double that of 1875. It was Mr. Carr's great ambition that from and after the 1st of January, 1889, the price of gas in Halifax should be reduced to 1s. 7d. per 1000 cubic feet, and that thus the ratepayers of Halifax should have the cheapest gas in England. I may say, too, that, in my opinion, if that is worth anything, Mr. Carr's ambition would have been gratified, had he been allowed to remain here.

I have several times been assured by Mr. Alderman Ramsden and the Town Clerk, two of the members of the Sub-Committee appointed on the 14th day of July, 1888, to enquire herein, that during their several months of search and enquiry, they have heard of nothing of a corrupt nature against my conduct as Chairman of the Gas Committee; but up to the 9th day of January last, the Mayor, the remaining member of the Sub-Committee, never spoke to me respecting the matter. On this day I was determined that I would ascertain whether he had received any information which was not known to the other members of the Committee; and I accordingly waited upon him in his parlour, and asked him whether, in the course of his enquiries, he had heard of any corrupt conduct on my part, and he told me distinctly that he had not. I then asked him why, seeing that my name was included in Mr. Fox's charges, he had not made this result of his long and exhaustive enquiry known to the public? To this he replied that it was because he had not been asked the question. Surely the Mayor should have made this known at the Council meetings without being asked to do so, especially since I could not ask him, as I have for several months past always been unjustly refused the right of speech when this matter was being discussed.

Mr. Carr, as good a servant as the Corporation ever had, has been hounded out of the town; I have been laid under a cloud of suspicion; 154 poor men are now out of employment; and this all, directly or indirectly, arising out of vague charges and insinuations unsupported by the slightest proof. The Mayor evidently thought he was about to unearth a system of theft and to expose a state of corruption of alarming magnitude; but up to the present, in spite of his assertion five months ago, that the alleged frauds with respect to the coal contracts were not mere hearsay, but would be proved up to the hilt, he has not taken any steps in respect thereto. Is the whole thing going to turn out a "mare's nest?"

I think the ratepayers are entitled to called upon the Mayor to answer (amongst others) the following questions:—

1. Who is Mr. Fox?
2. What is the knowledge that the Mayor has in his possession, that Mr. Carr has been bribed to a considerable extent, and which he said would be proved up to the hilt?
3. If Mr. Carr has been bribed, why has he not been made to disgorge his ill-gotten gains?
4. If, as the Mayor has distinctly said, he could prove that the Corporation contracted for coal of a certain quality, and received in its place coal of a value of 2s. 6d. per ton less than that contracted for, why has the contractor not been sued for breach of contract and made to pay damages for the fraudulent substitution, as the Mayor said it was the duty of the Corporation to do?
5. If the Corporation has paid for a very great quantity of coal which has never been received, why has the contractor not been sued in respect of this?
6. Where are the tests which will show that the Corporation has paid from 1s. to 1s. 6d. more per ton for its coal than it ought to have done; and who are the men who have prepared such tests, and can they be proved?
7. Why was Mr. Carr called upon to commence proceedings against the *Pall Mall Gazette* in respect of a paragraph which both his Counsel and that of the Corporation advised was not libellous?
8. What justification can be given for his dismissal on the grounds of such refusal?
9. Why have I been refused the right of speech at the Council meeting when this matter has been discussed?
10. Why should I be called upon to sue a man whom I have never seen, unless he accuses me of dishonesty or of personal gain?
11. Why does Mr. Fox refuse to state why I am unfit to occupy the position of Chairman of the Gas Committee, and to state the nature of the malpractices of which he accuses me?
12. Has the Mayor or the Sub-Committee appointed to enquire into this matter any proof of any conduct by me derogatory to my position of Chairman of the Gas Committee; and, if so, what?
13. Has the Lord Chancellor been asked to send down a Commissioner to enquire into the matter; and, if so, what was his reply?
14. Has the Mayor made a mistake in believing the rumours and accusations made in this matter; and, if so, why does he not candidly admit it?
15. Why has it been found necessary to appoint a man to the office now occupied by Mr. Hoggard, seeing that no such office existed under Mr. Carr's management?
16. What is the tale that the Mayor could unfold?

Yours truly, JAS. T. RILEY.

Savile Lea, Halifax, March 22, 1889.

THE ELECTRIC LIGHTING EXPERIMENT AT BARNET.

THE CONTRACTOR AND THE REQUIREMENTS OF THE BOARD OF TRADE.

At the Meeting of the Barnet Local Board last Tuesday—Mr. C. STEVENS in the chair—the subject of the position of the contractor for the electric lighting of the town (Mr. Joel), in view of the circular issued by the Board of Trade early last month (see *ante*, p. 252), in regard to the interference with public thoroughfares by persons not possessing statutory powers for electric lighting, was under consideration.

A report was read from the Lighting Committee, stating that they had discussed the terms of the Board of Trade circular, and had come to the conclusion that, in the face of this communication, the Board could not allow the streets to be interfered with by the electric light contractor, until the statutory powers referred to therein had been obtained. At a meeting held on the 18th inst., the contractor attended before the Committee, and urged the importance to him of the transfer of his liability under the existing contract to the proposed company. The Committee, however, pointed out that, after the receipt of the communication from the Board of Trade, they could not recommend such a course to the Local Board, until proper powers had been obtained by the contractor, as stipulated for in the contract. It was also shown to Mr. Joel that so far back as Dec. 5, 1888, he had been called upon to take steps to obtain these powers, and that his solicitors had replied that the matter was receiving their attention. On being interrogated as to what steps had actually been taken, Mr. Joel replied that his solicitors had written to the Board of Trade, and were doing all that was necessary. He expressed his intention of calling at the Board of Trade on the following day, and endeavouring to obtain relief from the existing circumstances, by pointing out to the authorities the limited time allowed him under the contract for placing his wires underground. He would then attend the Local Board meeting on that day; and, if possible, present a written communication from the Board of Trade, and also inform the Authority as to the exact steps taken by his solicitors.

Mr. POOLEY suggested that it would be well to have the opinion of the members generally; and he endorsed the suggestion of the Committee that the Board should refuse to transfer the contract from Mr. Joel to others until the requirements of the Board of Trade had been complied with.

Mr. SCHMIDT said he had seen Mr. Joel's partner, who informed him that Mr. Joel had been to the Board of Trade, and that the latter would not waive the obtaining of the powers specified in their letter. It was pointed out that the Local Board could only act in the matter after giving a month's notice of a meeting to consider it; and, following this, the contractor must advertise for three months in a local newspaper. In this

way four months must elapse before the contractor could commence laying the wires underground, which was running him too close to enable him to get the work done within the stipulated time. While refraining from making any promise, the Board of Trade appeared to be willing to waive the month's notice of the Board meeting, provided the Local Board wished it.

The report was adopted.

At a subsequent stage of the proceedings, letters were received from Mr. Joel's solicitors, asking that the Board would join with the contractor in a memorial to the Board of Trade, praying them to waive the month's notice required for the special meeting of the Local Board to give their consent to an application to the Board of Trade (which consent the Local Board was bound under the contract to give), so that he might proceed at once to give three months' notice by advertisement.

Mr. JAMES said he did not think the Board were called upon to help Mr. Joel out of a difficulty which he had created for himself. The Board had called Mr. Joel's attention to the necessity for proceeding to take steps to get his wires underground, as required by his contract; and he had allowed the matter to slide. The light so far was not satisfactory.

The CLERK read from the contract, to the effect that the Local Board must give such consent as might be necessary, and assist the contractor in any application he might make to the Board of Trade.

The CHAIRMAN said after hearing that he thought the Board must give formal consent to the application.

Mr. SCHMIDT proposed that a month's notice of a special meeting should be at once given to the members of the Board; and that meanwhile the Board ask the Board of Trade to allow the issuing of the necessary advertisement by the contractor, without waiting for the expiration of the month for the holding of the meeting to pass the formal motion sanctioning Mr. Joel's application.

Mr. JAMES: Would that gloss over past failures, and be a condonation of them?

The CLERK: I think not. You must assist the contractor, by your consent, in any application he may make to the Board of Trade for necessary powers. If you fail to do that you break the contract, and wilfully put the contractor into a worse position than he is in now.

Mr. HUGGINS objected to the Board going out of their way to help forward something that was unsatisfactory.

Mr. FISHER formally seconded the motion.

Mr. SAMUELS proposed, as an amendment—"That a reply, embodying the facts of the case as now before the Local Board, be sent to the Board of Trade, and that in the letter it should be shown that the Local Board are desirous of complying with its duties under the contract, and particularly with the rules of the Board of Trade."

The CHAIRMAN said he quite endorsed the view Mr. Samuels took of the case. The Board could in this way assist the contractor without committing themselves in any way.

Mr. SCHMIDT said this was all he wished; and he would therefore withdraw his motion.

The amendment was then put and adopted.

THE LONDON COUNTY COUNCIL AND THE GAS AND WATER UNDERTAKINGS.

At the Meeting of the London County Council on Tuesday last—Lord ROSEBERY in the chair—the following motion, standing in the name of Mr. J. Beal, was under discussion:—"That it be referred to the Finance Committee to consider the steps to be taken, if they so advise, as to acquiring the undertakings now supplying London with water and gas—as to the former whether new sources of supply should be reported on by the Engineers of the Council, and, if so, what time would be required for that purpose, having in view the Report of several Royal Commissions; and as to the latter, the recommendations essential as to the competition of electric supply—such report to be presented not later than June next, in order to permit the requisite notices to be considered, prepared, and given in November for the ensuing session, and that the requisite powers may be obtained by any Bill promoted this session by the Council."

Mr. BEAL, in submitting the above motion, said he noticed that an amendment had been placed upon the *agenda* paper, the object of which was delay. This had been the order of the day upon this question with every public body for the last 60 years; and it was not for the County Council now to introduce delay. Then he had been told by several friends that they did not think it wise to refer this question to the Finance Committee. He did. They were dealing with great public interests, involving millions of capital, and immediately associated with the Metropolis. The faintest word that might be uttered by members of the Council might lead to a great misunderstanding of the objects of the motion. As finance was a science, and the Council had the greatest master of this science in England as Chairman of its Finance Committee, in the person of Lord Lingen, public confidence would be secured by this question being placed in his hands. Years ago—60 years ago—the public began to understand that they wanted a different or a better supply of water. That was in 1828; and there was no inquiry from that time down till 1852. Then a Bill, called the Metropolis Water Bill, was passed, which contained one very effective clause which had now been put into operation. Then delay came, as it would come again, until 1869, when there was a Royal Commission. Then in 1870 he introduced a Bill into the House of Commons with the view of dealing with the undertakings of the several Companies. The Board of Trade and the Government, however, who took it up, failed to obtain the desired object; and then nothing was done till the year 1878 or 1879. Then the cry became so loud that a great public meeting was held at Exeter Hall, at which Cardinal Manning presided; and as the result, a Bill was prepared which was introduced by Sir Richard (now Lord) Cross in 1880, in order to make another attempt to settle the matter. It was, however, still unsettled; and this very brief history would show what an important part delay had played in connection with this question. In 1880 a Bill—no doubt honestly intended, was introduced, as he had said, by Sir Richard Cross, but the Government went out; and then a Select Committee met, under the presidency of Sir William Harcourt, and settled two or three points which must be borne in mind at the present time. One was that there was no monopoly in the supply of water, and that the Water Companies had not vested interests secured against the interests of the public. There the point remained at the present—that there was no monopoly in this matter of the water supply; and therefore he had suggested in the resolution that the Council should look out for means of obtaining new sources of supply. If to-day 120 million gallons of water were taken from the Thames, and it was known that this quantity was not sufficient, and that in 30 or 40 years 250 million gallons would be required, it followed that inquiry must be made, and that they must learn where this additional water was to come from. Inquiry, therefore, must go before legislation. Then he came to the rather important matter of the price of the shares of the Water Companies. They were certainly advancing by leaps and bounds. In 1870 the New River Company's £100 shares were quoted at £195. After Sir Richard Cross's Bill, they rose to £375. When the statement was made, and properly made, that the Companies had no monopoly and no vested interest, the shares fell; and in the case of the Grand Junction Company, where they had risen to £125, they dropped to £115. In the case of the New River Company, they fell to £356. This indicated the delicate nature of the inquiry. If property of this kind was touched, it must be distinctly laid down in the public mind that it was not proposed by the Council to deal with it as charlatans, but as administrators of a great Municipality. The income of the Water Companies rose in four years from £1,000,000 to £1,405,000. Then they had been allowed to sell their own shares at par; whereas the Gas Companies had for many years been compelled to put their shares up to auction. This was another matter on which information must be obtained and provision made, that in the issue of new shares the premiums should go to the public, and not to the shareholders. If the Council acquired these undertakings, its credit would enable it to borrow money at 3½ per cent., and heavier interest would be saved. What was true of the Water Companies was equally true of the Gas Companies. Since the gas inquiry was held in 1857—30 odd years ago—the number of Companies north of the Thames had been reduced from eleven to one, by amalgamation, &c.; and while in 1857 the price of ordinary gas was 4s. 6d. per 1000 cubic feet, it was now 2s. 4d. or 2s. 6d. This was a saving of 2s. 2d., and every penny of this meant £50,000 per annum; or, in other words, £1,250,000 had been saved to Londoners by the operations of those municipal reformers who had fought hard and dealt with this question. The way could be paved, by caution and conference, to make good this work; and if without a Council this million and a quarter sterling per annum had been saved to the Metropolis, what ought they not to do with the County Council? In other municipalities, thousands of pounds which had been saved in this way had been expended on improvements; and it should be done in London. They did not want to raise a suspicion that the highest interests of the proprietors of these undertakings would not be considered; and they wished to let it be known that due regard would be had to their rights and interests. With this view he asked the Council to accept the resolution he had proposed, in order that progress might at once be made in this question. The quickest progress would be slow; but, in view of the delay which had already taken place, they should start now, and they would undoubtedly make progress.

Mr. E. S. SMITH seconded the motion.

Mr. FORD, in supporting the motion, said Mr. Beal, as a veteran reformer, had touched the crucial point when he told the Council that they must consider the question of a further supply of water before they proceeded to make any proposition with regard to the Water Companies. This matter, he would suggest, was one of great urgency; and he was delighted at the way in which Mr. Beal had put the case, so that proper investigation might take place. When it was considered that the supply of water for the City was taken from the Thames, and that the sewage was emptied into that river, one saw that it was an abominable state of things that such a concoction should be put into pipes and delivered to the people for drinking purposes. From the example which had been set them by other great cities, it was obvious that it was not difficult to get a splendid supply of water; and he ventured to say that they would never come to terms with the Water Companies themselves unless they had the alternative of conveying a large supply to the City. This would have the effect of bringing the Companies to a reasonable state of mind.

A COUNCILLOR remarked that there was no doubt the supply of water—that necessity of life—ought not to be in the hands of Companies trading for profit, and should be in the hands of the public themselves. But he thought it was a totally different matter in regard to gas. There was no doubt at all that science would probably introduce, on the lines of the electric light, some means of illumination which would sooner or later supersede gas; and while there was a very strong case for water, the purchase of the Gas Companies' undertakings was a matter which was fraught with a certain amount of risk, and not, therefore, in his opinion, an advisable thing to undertake.

Captain JAMES moved, as an amendment—"That, in the opinion of this Council, it is inexpedient to take into consideration the motion of Mr. Beal until sufficient time has elapsed for the Council to have thoroughly mastered the duties at present conferred on it." He said he was fully in accord with the resolutions of the Select Committee of the House of Commons, which took, to his thinking, a very sensible view of the subject of the water supply of London. The question at stake was so great that he considered it would be undesirable, in the present state of public business, that the Council should at once plunge into its solution. First of all they should get thoroughly into harness, and should understand the administration which they must necessarily take up, before they undertook to deal with this great question. There were on the Council 137 members, who had to take over the duties of the Metropolitan Board of Works; and there were only seven members of that old administrative body included in the 137. What did this mean? It meant that, first of all, the citizens of London probably thought these 137 gentlemen would discharge those duties better than the old body; but he considered the citizens would be of the opinion that the 130 gentlemen who had to make themselves familiar with new and very complicated duties should learn them before they plunged into a question of this character. There appeared to be another objection to the resolution in the form in which Mr. Beal had put it. He coupled water and gas together; but he (Captain James) considered that the water question stood in a very different position from that of the gas supply. The gas question was solving itself by the introduction of the electric light; although it was still in embryo. There was at present no district in London where the electric light was as yet thoroughly introduced, although there were districts where its adoption was pending. To put these two things together was a mistake. Lastly, there appeared to him the objection, in the latter part of Mr. Beal's motion, that he asked the Council to do that which the Council had not the power to do—to promote a Bill. For these three reasons he proposed his amendment.

Mr. TOBE submitted that the amendment was out of order.

The CHAIRMAN ruled that the amendment was quite in order.

Mr. RHODES remarked that there could be no doubt as to the grave importance of turning early attention to the question of the water supply; but he followed the opinions which had been expressed as to the inadvisability of importing the gas question into the matter. To his mind, this stood on a totally different basis to the water question, which was singularly mixed up with the health and well-being of the less well-to-do classes. He was credibly informed that, as far as gas was concerned, there were only about 33 per cent. of the houses in London in which it was used for domestic purposes.

Mr. BEAL remarked that it would save time if he left out the question of gas.

Mr. FOSTER objected to the wording of the motion. He said the Council was the proper body to determine whether it was or was not desirable to acquire the gas or the water undertakings. The terms of the resolution were to leave it entirely to the discretion of the Finance Committee to advise

as to this course. He thought the Council ought to affirm the principle of Mr. Beal's motion, and say that they considered it desirable that they should acquire the water undertakings; and he would suggest that the words "if they so advise" should be struck out, and that the resolution should go to the Committee in the form that they were to report upon the steps to be taken. Certainly, the majority of the Council were distinctly in favour of the water supply of London being in the hands of the Council.

A Councillor remarked that he had heard that the New River Company's supply was giving out; and therefore it was absolutely necessary that no time should be lost in going into the question of new sources of water. This was the essence of the whole matter; and the greatest thought and energy should be given to it.

Mr. Hopkins proposed, as a further amendment, to substitute the words "General Purposes Committee" for "Finance Committee."

Alderman Fleming Williams seconded the proposition. The Committee should at once lay out some scheme by which new sources of supply could be discovered.

Mr. Marks said Mr. Beal had very properly laid great stress upon the benefits to be derived by municipalities taking over the water supply; and had instanced the advantages which had been gained in places where this had been done. The very essence of the question was the financial aspect of it. The councillors were probably agreed as to the principle of acquiring the supply. But before they could take any practical steps to carry this principle into effect, it was important to know the financial bearing of the question; and he failed to see how a measure providing for taking over this business could be prepared until the Council had the statement verified that these undertakings would form a source of permanent profit. How could the Council ascertain whether they were likely to become profitable, and how were they to learn the details of the matter, unless the Finance Committee was given the opportunity of inquiring into these points? He should therefore support the original motion.

A Councillor agreed as to the necessity of finding out fresh sources of supply, and remarked that the Council would never commit itself to the purchase of the water undertakings. It must, he said, be manifest to the lowest intelligence that the basis of the Companies' charges was altogether disproportionate to the quantity of water consumed. There was no more water consumed in a house where the householder paid £500 per annum, than there was in one at £50; but the one householder paid ten times as much for water as the other. Under these circumstances, it was perfectly clear that the Council could never commit itself to purchasing the property of the Companies on the basis from which they derived their profits. The best plan would be to direct the attention of the Committee to which the matter was referred chiefly to the duty of ascertaining what fresh sources of supply might be available.

Another Councillor asked what would be the cost of the inquiry; expressing the opinion that it would be very serious.

Mr. Beal said he thought that about £4000 would cover the cost of the inquiry which it would be necessary to make.

Captain Probyn considered that the Council should have a Special Committee to deal with this question. He understood that even if the present sources of supply failed, there would not be much difficulty in getting others, and that the Surrey Hills were full of water.

Captain James said he was willing to withdraw his amendment in favour of Captain Probyn's proposal.

Mr. Tobb protested against the number of Committees being constantly increased.

Mr. Clarke said the Committees already had as much work as they could fairly do; and he considered that a Special Committee, consisting of a few men who could give special attention to this question, should be appointed to deal with it, rather than that it should be referred to any one of the standing Committees.

Sir J. Lubbock, M.P., remarked that the question of new supplies was an entirely different one from that of purchasing the existing undertakings, and must be regarded from a different point of view. The Finance Committee was not the Committee from which the Council would learn what they wanted to know; and therefore he thought the Council should refer the question of additional sources of supply to a Special Committee.

Mr. Haggis also considered that there should be a Special Committee.

It was then agreed that the question should be put.

The Council decided that Mr. Hopkins's amendment should be withdrawn; and the resolution was unanimously agreed to in the following terms:—"That it be referred to a Special Committee to consider the steps to be taken as to acquiring the undertakings now supplying London with water; whether new sources of supply should be reported on by the Engineers of the Council, and, if so, what time would be required for this purpose, having in view the report of several Royal Commissions—such report to be presented not later than June next, in order to permit the requisite notices to be considered, prepared, and given in November for the ensuing session; and that it be referred to the Parliamentary Committee to consider whether the requisite powers cannot be obtained by some Bill promoted this session by the Council."

It was left to the Standing Committee to appoint the Special Committee.

Southend Gas Company.—The annual meeting of this Company was held last Wednesday. The Chairman (Mr. C. Woosnam), in moving the adoption of the report—an abstract of which was given in the Journal a fortnight ago, p. 495—feelingly referred to the decease of the respected Vice-Chairman (Mr. G. Vandervord), who had been connected with the Company for upwards of 35 years. Alluding to the reduction which was made in the price of gas in July last, he said the shareholders would be pleased to learn that the increased consumption during the six months the reduced charge had been in operation had made up in amount what had been lost by the reduction. The resolution was carried; and the dividends recommended by the Directors were declared.

Northern Coal Trade.—There is a decided lull in the coal trade; but its causes are believed to be temporary. A strike at the blast-furnaces of the north-west has thrown the coal that would have been used there into the market; and in consequence, with fuller supplies, the prices have been easier. Best steam coal—Northumbrian quality—has been quoted as low as 9s. 6d., which is a fall of about 6d. per ton; but for coal for forward delivery, higher prices are asked. Gas coal is easy; the local consumption being now much less than it was. There is a fair quantity of coal being shipped, and more would be sent if steam tonnage for transit were plentiful; but storms have delayed arrivals. Still the chief gas coal collieries are well employed; and the Baltic shipments, which cannot now be far off commencing, will replace any further falling off in the local demand. Best gas coal is about 7s. 6d. in quotation; but there are contracts which will make the average price less satisfactory to the miners. Some of the workmen are already putting in claims for advances when the sliding scale terminates—as high as 20 per cent. advance having been spoken of as desirable. House coal is depressed. Gas coke brisk.

PROPOSED COMBINATION IN THE COAL TRADE.

Our readers may remember that some few months ago rumours were current that an extensive combination in the coal trade was being projected. The scheme has now taken definite shape, as will be found from the following article furnished to the *Daily News* last week by their Manchester correspondent:—"When the proposed formation of a Coal Syndicate was first mooted a few months back, the project was generally regarded with incredulity as an operation of far too gigantic proportions to be at all practicable. Recently, however, steps have been taken for bringing the matter under the consideration of the coal-owners throughout the North of England, which places the project on something like a definite basis. The proposal as put forward to the trade is termed 'The Coal Owners', Lessees', Workmen's, and Consumers' Co-operative Association, Limited;' and in proposing an amalgamation of the whole of the coal interests in the United Kingdom, the proprietors state that they wish to make it clear at once that they do not contemplate in any way a monopoly or trust for the sole benefit of the proprietors, but a combination, which they believe will be to the benefit of coal-owners, lessees, and workmen, and to consumers of all classes in this country. Their proposal is that, whilst on the one hand the lessees of coal will receive, in exchange for their interests in the properties worked by them, shares and debentures in a company to be formed for that purpose in the proportion of one-third in debentures bearing interest at a rate not exceeding 5 per cent. per annum, and the remaining two-thirds in shares, and whilst the workmen should be secured from the troubles brought about by quarrels with employers, and have the benefit of an insurance fund in case of illness, on the other hand the benefit of all saving—whether arising from economy in working, saving of waste production, loss from strikes, and competition of agents, or from economy of interest arising from the distribution of the capital invested in coal into debentures and shares—after providing for the necessary reserves, for further sinking and deeper workings, interest on the debentures, and a dividend not exceeding 10 per cent. on the shares, shall be applied to the benefit of the consumer by the reduction of the selling price. It is anticipated that the amalgamated company will be able to effect a considerable saving by economy of management and in working the coal—for instance, by improved facilities for ventilation and pumping of water—and a great saving to the country, by bringing to market the very large quantity of coal now sacrificed in the numerous internal barriers between the different properties required under the present system. The proposers believe that it is unnecessary to invoke the aid of Parliament to carry out their proposal, as from inquiries which it is stated they have made, they are led to believe it will be very generally welcomed as beneficial to all classes; but as it may be found desirable that some public body should control the board of directors of the company, so as to protect the interests of the public, they contemplated authorizing the Board of Trade, either in the Articles of Association of the company, or, if necessary, with Parliamentary sanction, to superintend and control the amount of the reserve fund, the checking of accounts, and the amount of dividend, so as to permanently secure to the public consumers in this country the benefits contemplated. It is further set forth that the project, by steadying the price at which coal can be purchased, will undoubtedly be beneficial to consumers who are exposed under the present system to uncertainties and changes which constantly prevail through misunderstandings with workmen and excessive cost of management and distribution. It will also ensure the best possible provision being made in all collieries for the safety of the workmen; and it is proposed that an insurance fund should be formed for disabled workmen and their families, similar to the present Miners' Permanent Relief Fund. Further, the workmen would be given an interest in the business of the company by an increase of their fixed wages *pro ratâ* to any benefit arising to the public from a reduction in price on the basis of a sliding scale. The project does not contemplate immediately absorbing the landlords' interests; but the company is to take power to purchase the same from time to time as favourable opportunities occur. It is calculated that the total capital required to acquire all the lessees' interest would not exceed £97,500,000, or, in round figures, £100,000,000; and in considering this sum as the proposed capital of the company, it must be borne in mind that it is equalled by the capital of more than one of the railway companies in the kingdom. This capital would be represented by shares and debentures—say, two-thirds of it in shares, and one-third in debentures. In addition to the insurance fund already referred to for the workmen, a reserve fund to provide for extensions and sinkings would be set aside, so that new collieries might be opened out to carry on the work of production, and prevent any exhaustion or limitation of the quantity of available coal. The project so far has not been taken up at all unanimously by the coal-owners in the various districts which are affected by the proposed scheme; and these comprise Scotland, Durham, Northumberland, Wales, Monmouthshire, Derbyshire, Yorkshire, Lancashire, and Cheshire. In one or two districts it is regarded as impracticable; and so Wales at present declines to join in the movement. In the Yorkshire district the scheme has been accepted, providing other districts come in; and with regard to Lancashire, a numerously-attended meeting of coal-owners has been held in London, at which, however, several of the principal coal-owners of South Lancashire and Cheshire were not present, and the leading colliery proprietors in the Manchester district took no part. At this meeting a resolution was passed expressing general approval of the principles of the scheme, and that, subject to other districts being of the same opinion, another meeting should be held, when the details could be further discussed; also that it be left to the gentlemen present, by themselves or a Committee of their body, to draw up suggestions on the subject. It was further resolved that Mr. John Mercer, of Collinsgreen, near St. Helens, be appointed Chairman of the Lancashire and Cheshire district, and that a further meeting be held at Manchester for the purpose of electing a Committee to act with the Committees for other districts, and to draw up suggestions for the general meeting."

A large and representative meeting of Lancashire and Cheshire coal-owners was held at the Queen's Hotel, Manchester, last Friday, under the presidency of Mr. J. Mercer, when a resolution approving of the scheme was passed, and a strong Committee was formed to act with the Committees for other districts, and to draw up suggestions for convening a general meeting of coal-owners to further consider the subject. It was also decided that the Committee should communicate with those colliery proprietors who have not yet expressed their opinions as to the proposal for co-operation, with the view of ascertaining whether or not they are favourable to the scheme.

A correspondent of *The Times* says: "The suggested formation of a Coal Syndicate is causing the labour representatives and those connected with Miners' Unions to be on the alert against what they look upon as a combination on the part of capitalists to not only rule an important industry, but to subjugate labour. The leaders of the men look with distrust on the promises made with respect to workmen, and laugh at the idea of such a combination securing 'workmen from trouble brought about by quarrels with their employers.' . . . A feeling exists among the leaders of the labour movement that they should at once put themselves in a position to form a strong Syndicate of labour."

EAST LONDON WATER-WORKS COMPANY.

The report of the Directors of this Company for the half year ending Dec. 31, 1888, which will be presented to the proprietors at their meeting on the 2nd prox., unlike that for the corresponding period of the previous year, shows a decrease in the revenue. In the latter half of 1887, it was £136,604; whereas in the six months now reported upon it was only £136,062. On the other hand, the expenditure was reduced by £5929; the figures being as follows:—In 1887, £54,979; in 1888, £49,050. The Directors state that the falling off in the revenue arose principally from a reduced road-watering account, owing to the rainy season. The increase in the ordinary domestic supplies was about the average. The reduced expenditure was owing to exceptional credits for work done, which were brought into the accounts for the past half year, but which cannot be relied upon in future. The sum of £15,806 was expended in continuing extensions in hand. The well, engines, and works at Waltham are completed; and the new reservoir at High Beech is charged with water from the chalk—supplying by gravitation the districts of Waltham, Loughton, Buckhurst Hill, Chingford, Chigwell, Chigwell Row, Barking Side, and Woodford. The wells at Walthamstow and Lea Bridge are making satisfactory progress. The Directors have for some time had under consideration the desirability of concentrating the main pumping operations of the Company at Lea Bridge, and disposing of the land at Old Ford. A favourable opportunity of doing this having presented itself, they have availed themselves of it, and have concluded satisfactory arrangements with the Midland Railway Company for the sale to them of the Old Ford site and buildings. Plans and estimates for the necessary works to carry out this change have been prepared by the Company's Engineer (Mr. W. B. Bryan, M. Inst. C. E.). Tenders have been invited from the leading engineering firms for the supply of engine power required, and that of Messrs. Yates and Co., of Blackburn, has been accepted. The Directors have every confidence that this step will prove of great value in promoting increased efficiency and economy in the working of the undertaking. The amount produced by the sale of the Old Ford station will go far to meet the necessary outlay. The quantity of water pumped during the half year amounted to 7,351,923,724 gallons; being equal to 33 gallons per head of the population daily. The new services laid on numbered 2267, against 2395 in the corresponding half of 1887; the total number being 163,465. The third portion of the 4½ per cent. debenture stock authorized by the Company's Act of 1886, amounting to £53,000, was issued on the 23rd of December last under public tender, and realized £71,683 14s., averaging 35¼ per cent. premium. The Directors, deeming that the time had arrived for this stock to be quoted, made the necessary application to the Committee of the Stock Exchange, and a quotation may now be found in the Official List. The Directors recommend a dividend on the ordinary stock at the rate of 7½ per cent. per annum (less income-tax). This will absorb £64,521, and leave an unappropriated balance of £16,993.

METROPOLIS WATER SUPPLY.

Messrs. Crookes, Odling, and Tidy, in the course of their report to the Official Water Examiner for the Metropolis (General A. de Courcy Scott) on the quality of the daily samples taken of the water supplied to London during the past month, say: "The water supplied to the Metropolis during the past month, despite the unfavourable state of the weather and frequent prevalence of frost and heavy snow, continued to be of excellent quality; and its variation in mean composition, as compared with that of the previous month's supply, though not, indeed, of any significance, was in the direction of an increased degree of freedom from organic matter. It may be well to restate on this occasion that our estimate of the degree of freedom of the water from organic matter is based mainly on the concordance of two sets of determinations—viz., a daily determination, by means of permanganate of potash, of the weight of oxygen expended in the oxidation of the organic matter present in a daily-collected sample of each Company's supply; and in a weekly determination, by the combustion process, of the weight of organic carbon present in a weekly sample of each Company's supply, collected on some one day during the week. In this way, the mean weights of oxygen expended in the oxidation of the organic matter present per gallon in the Thames-derived water in the months of January and February were found to be 0·062 and 0·056 grain respectively; while the mean amounts of organic carbon present in 100,000 parts of the water were found to be 0·170 and 0·161 part respectively. The maximum amount found in any of the samples examined in February, or 0·173 part in 100,000 parts of the water, corresponds, as nearly as may be, to about one-third of a grain of organic matter per gallon. In the case of the East London Company's water, the mean weight of oxygen absorbed from the permanganate was found to be 0·045 grain per gallon; and the mean amount of organic carbon was found to be 0·145 part in 100,000 parts."

THE LIGHTING OF RAILWAY CARRIAGES BY GAS.—During the half year ending with January last, the North British Railway Company spent £182 on Pintsch's gas-fittings for lighting some of their carriages, and a smaller sum for electric light apparatus. In the current half year, they propose to spend £1373 on gas and electric light fittings.

GAS EXHIBITION AT HUDDERSFIELD.—During the week ending the 16th inst., an exhibition of gas stoves and appliances was held in the St. Peter's Assembly Room, Huddersfield. All of the exhibits were supplied by the local representatives of Messrs. T. Fletcher and Co., of Warrington. Lectures on cookery were delivered by Miss H. M. Young; and both these and the exhibition were largely patronized.

THE QUALITY OF LEEDS GAS.—At the meeting of the Gas Committee of the Leeds Corporation held last Thursday, it was resolved to ask Alderman Spark to attend the next meeting of the Committee and substantiate the allegations he brought forward at the last meeting of the Council (*ante*, p. 496) as to the management of the gas-works. On that occasion, it may be remembered, Alderman Spark said he had been surprised to hear Mr. Gilston (the Chairman of the Committee) state that the illuminating power of the Leeds gas had improved. The illuminating power of the gas had never, he said, yet been up to the standard required by the Magistrates, and undertaken by the Committee in June, 1888. As compared with 1884, the quality of the gas for the past six months had been not less than one candle below that supplied in that year. If a Committee of Investigation were appointed on the subject, he undertook to say that the most extraordinary things would come out with regard to the gas management. There was a vast amount of trickery going on in the gas-works of the borough of Leeds. He would undertake to prove that when the testing was being done they were able by means of a pipe to turn on gas of another quality. He would undertake to prove numbers of things by which the Corporation were losing vast sums of money. The leakage, for instance, amounted to about 3d. per ton of coal carbonized, as against 2d. in other towns. This represented a loss of not less than £10,000 a year. A letter was read from the Magistrates with regard to the low quality of the gas supplied to customers; and it was referred to a Sub-Committee to consider and report upon.

THE NEWCASTLE WATER COMPANY'S BILL AND THE TOWN COUNCIL.

At the Meeting of the Newcastle Town Council last Wednesday—the MAYOR (Mr. T. Richardson) presiding—a report was submitted by the Parliamentary and Bye-Laws Committee on the Bill of the Newcastle and Gateshead Water Company now before Parliament. After stating the powers sought by the Company, the report proceeds: "A petition has been presented by the Duke of Northumberland, by which it is sought to obtain a compulsory supply of water by the Company to his Grace's property at Tynemouth and neighbouring parishes. The Committee consider that a compulsory supply of water by the Company to Tynemouth or any other place beyond the limits of the Company's supply would seriously interfere with, and be most prejudicial to, a constant and efficient supply of water to Newcastle, and should be opposed by the Corporation. Petitions have also been presented by the Gateshead Corporation and the Felling Local Board, who seek to make it obligatory upon the Water Company to supply water in those higher portions of Gateshead and Felling which the Company are not now compelled to supply. The Committee consider that the portions of Gateshead and Felling referred to, being within the limits of the Company's supply, are entitled to consideration before places beyond those limits, and that the Corporation, so far as they can do so, should support the contention of the Gateshead Corporation and the Felling Local Board. The Committee consider that clauses should be inserted in the Bill—(1) Making it obligatory upon the Company to commence to pump water for trade and manufacturing purposes from the River Tyne when there are not in the Company's reservoirs on June 30 1600 million gallons of water; on July 31, 1250 million gallons of water; on Aug. 31, 850 million gallons of water; and on Sept. 30, 600 million gallons of water. (2) Increasing the quantity of water which, by section 29 of the Newcastle and Gateshead Water-Works Act, 1870, is required to be in the Hallington and Whittle Dene reservoirs before any water is supplied in bulk to North Shields from 200 million to 600 million gallons. (3) Giving the Corporation power at all times to inspect and take copies of the record kept by the Company of the daily gaugings of their reservoirs. (4) Providing for the fixing by the Company of fire-hydrants provided by the Corporation (either in addition to or in lieu of fire-plugs), and for replacing the present fire-plugs or other apparatus for obtaining water for extinguishing fires. (5) Providing for the laying down in streets in which water-mains are already laid of all further or additional mains under the direction of the Corporation, and in such positions as they shall approve. The Committee recommend that the Corporation appear by Counsel upon this petition in opposition to any attempt by the Duke of Northumberland or any other person to obtain a compulsory supply of water to Tynemouth or any other place beyond the limits of the Company's supply, and in support of the above clauses."

Alderman HAMOND, in moving that the report be confirmed, said this was one of the most important matters that had come before the Council for a long time. They must not permit, as far as they were able, any undue interference with a full and adequate supply of water for Newcastle and Gateshead. The Duke of Northumberland, for the first time, appeared to take a peculiar interest in the supply of his manor of Tynemouth, which was fifty or sixty miles from the River Reed, from which the Water Company proposed to draw their supply. The Company had progressed from difficult to prosperous times; and their stock now stood at £119 premium. A very fair price was paid for the water supplied; but they had never once asked for a reduction from the Company, because they had been satisfied that private enterprise should have its fair and legitimate reward, so long as that enterprise secured a full and ample supply of water. This being so, he felt it rather acutely that the Duke of Northumberland should come in, and almost demand a water supply for Tynemouth at their expense. He hoped there would be no hesitation on the part of the Council to make a most determined objection to such a proposal. His Grace had adequate means of providing from North Shields a supply of water for his manor.

Alderman YOULL seconded the motion, which was carried.

Alderman HAMOND said it was proposed that a deputation of the Council should meet the Directors of the Water Company that day with regard to the arrangements which the Council had to make, and also respecting the Duke's petition. They wished also to meet the Gateshead Corporation and the Felling Local Board on Thursday to see how far they could have combined action when they went into Committee. He proposed that the deputation consist of Sir Benjamin Browne, the Mayor, himself, and the Vice-Chairman of the Committee, with power to act on the instructions just agreed to.

Mr. BIRKETT seconded the proposal; and it was carried.

FENNY STRATFORD WATER SUPPLY.—An artesian tube-well is being sunk in the lower greensand formation, in search of a supply of water for Fenny Stratford, by Messrs. Le Grand and Sutcliff. The site of the boring is an elevated one near Little Brickhill, about three miles from the town; and the first 100 feet was penetrated within 14 days of commencing boring operations. The work is being carried out under the supervision of Mr. J. Eunson, Assoc. M. Inst. C.E., of Northampton.

THE CHARGES IN CONNECTION WITH THE MANAGEMENT OF THE SALTLEY GAS-WORKS, BIRMINGHAM.—Our readers may recollect that the outcome of the proceedings at the meeting of the Birmingham City Council on the 19th ult. (*ante*, p. 399), when the system of management adopted by Mr. H. Hack at the Saltley works of the Corporation was much criticized by certain members, was an investigation of the whole of the charges by the Gas Committee, with Messrs. Bloor and Granger, as representing the workmen, in attendance. The inquiry has been continued from time to time until last Wednesday, when it closed; the above-named gentlemen expressing the opinion that the Committee had pursued the matter as far as could be reasonably expected, and stating that they were much obliged to the Committee for the time they had devoted to it. The Committee will probably report both upon this subject and the gas-fitters' memorial, to which reference was made in the JOURNAL a fortnight ago, in time for the meeting of the Council next month.

THE SALFORD GAS-WORKS DEPRECIATION FUND.—A meeting of representatives of out-townships which receive their supply of gas from the Salford Corporation was held last Thursday, at the Victoria Hotel—Mr. S. Mellor, Chairman of the Barton and Eccles Local Board presiding—to consider the proposal of the Gas Committee of the Salford Town Council to appropriate the sum of £60,000, being part of their depreciation fund, in aid of the rates of the borough, to the exclusion of the inhabitants of the out-townships. There was a large attendance; amongst the public bodies represented being the Barton and Eccles Local Board, the Swinton and Pendlebury Local Board, the Barton Rural Sanitary Authority, Barton Guardians, Little Hulton Local Board, and the Boothstown Wardens. As the result of a full consideration of the matter, it was resolved to send a deputation to the Salford Gas Committee for the purpose of objecting to the appropriation of the sum of £60,000 in the manner proposed, and to ask for the abolition of the differential rate for gas supplied to the out-districts.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday*.

Quite a remarkable change has come over the spirit of the Arbroath Gas Corporation upon the subject of extending the gas-works. There has always been a minority in the Corporation opposed to the extension; and they have succeeded in postponing a decision, as well as in forcing the Corporation into the cost of two reports by Consulting Engineers upon the condition of the present works. In both reports the extension was urged; and at the last meeting of the Corporation, it was remitted to the Works Committee to consider these reports and state what works they regard as essential to execute. A meeting of the Corporation was held on Thursday; and I confess I am greatly surprised that the report of the Works Committee should have been to the effect that the members, having inspected the purifiers, were of opinion that it was not necessary to renew them. With reference to the whole scheme, the Committee resolved to recommend that none of the proposed extensions should be proceeded with, and that the works should be carried on as heretofore; the plant, in their opinion, being already quite sufficient to meet the wants of the town at present. The Committee also recommended that the existing system of retorts should be used next winter. There were now 40 retorts in the bench which had been in use during the past winter; and the Committee suggested that, to provide for any increased consumption that might take place next winter, two additional ovens, containing four retorts each, should be added to the bench, at a cost of about £150. While the report was being discussed by the Corporation, several members left the meeting; and a decision was not arrived at. It is hard upon the Manager (Mr. R. S. Carlow), after so nearly attaining the means which would have enabled him to carry on his work more satisfactorily, to have his efforts thus checkmated. He has this satisfaction, however—that the opposition began by confessing their inability to deal with the subject; and hence the necessity for an Engineer to be called in. But now, after two Engineers have been consulted, they fly in the face of both, and decline the advice which they themselves sought. This is sufficient to show the quality of the men who oppose the extension of the gas-works.

Mr. R. S. Carlow delivered a lecture on "Gas and Gas Making," in connection with the Arbroath Young Men's Christian Association, last Wednesday night. The lecturer illustrated his remarks by experiments, the most valuable of which, from a practical point of view, were those connected with burning gas, and the use of governors. At the close of the lecture, Mr. Watson, the Burgh Surveyor, said he could have wished that Mr. Carlow had brought forward more prominently the enormous waste of gas which took place through the use of inferior burners. The public generally were not aware of the fact that about one-third of the burners in use were defective. It had been estimated that a bad burner consumed about 25 per cent. more gas than it should for the illuminating power it gave. Applied to Arbroath, this meant a loss of £800 a year.

Mr. W. Coutts, the Chairman of the Banff Gaslight Company, died on Sunday last. Mr. Coutts was one of those all-round men who are often found in country towns; having, on account of his many good qualities, been actively connected with the management of a considerable number of public bodies.

The results of the working of Deacon waste-water meters in Edinburgh were reported to the Works Committee of the Edinburgh Water Trust on Thursday. The meters were put down in four districts of the city—Stockbridge, Glenogle Terrace, Buckingham Terrace, and Merchiston. It has been found that in Stockbridge the consumption of water was reduced from 20·76 to 17·37 gallons per head per day—a reduction of 17 per cent. In the Glenogle Terrace district, the reduction was from 21·06 to 14·18 gallons, or at the rate of 33 per cent. In Buckingham Terrace district, it was from 43·48 to 36·66 gallons, or at the rate of 14 per cent. In the Merchiston district, it was from 41·81 to 36·90 gallons, or at the rate of 11 per cent. These figures and calculations are given by the supporters of the Deacon meter system, who have thrust it upon the Water Trust. Calculated by percentages, the saving looks large—being 19 per cent. of the whole; but when the statements are made direct, the results are not so favourable to the meter system. The actual savings were: Stockbridge, 3·39 gallons per head per day; Glenogle Terrace, 5·88 gallons; Buckingham Terrace, 6·82 gallons; and Merchiston, 4·91 gallons—or, taken all over, a saving of 5·25 gallons. Now, when the system was brought under the notice of the Trust, Mr. Hope, the Managing Director of the Deacon Company, informed the Works Committee that the quantity wasted would amount to between seven and eight million gallons per day. He admitted the waste from defective apparatus in dwelling-houses would be so trifling as not to make it worth while to adopt the meters, and asserted that the real waste was caused by defective mains and service-pipes, which allowed the water to escape under the houses or into the drains. The results do not bear out any of Mr. Hope's statements. In the first place a saving of 5·25 gallons per head per day would only amount to 1,983,450 gallons over the whole city; and, in the second place, it is stated that "in most cases the waste was found to be due to defective, ball-cocks." In Stockbridge three service-pipes were found to be defective, and in Buckingham Terrace three burst ones were discovered. The adoption of the Deacon meter was advocated as a means of avoiding the necessity for introducing an additional water supply; but unless it can save more than two million gallons per day, it is not likely to be of very much service in that direction.

The question of introducing salt water into Edinburgh, which last year was the subject of voluminous inquiry by the Town Clerk of Edinburgh, was considered by the Works Committee of the Edinburgh and District Water Trust, on Thursday. A long discussion took place regarding the matter; the opinion generally expressed being that the Trust had no power to take any steps in such a scheme. It was agreed to inform the Town Clerk that they could not entertain the proposal; but that if the city resolve to go on with the project, the Water Trust would not raise any objections.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

The Paisley Gas Trust have resolved, I understand, to make important extensions of the gas-works under their charge, so as to adapt them to meet the rapidly-increasing demands for gas within the burgh and its immediate suburbs. The most important portion of the work that is to be undertaken is the construction of a gasholder tank and holder for the same which will be larger than any yet constructed in Scotland. The holder will be 162 feet in diameter by 64 feet in height; so that its capacity will be upwards of 1¼ million cubic feet. It may be remembered that the large holders in Glasgow (of which there are seven) are 160 feet in diameter by 60 feet in height, and which will be left somewhat in the shade by the new holder at Paisley. There is a moral certainty, however, that one of the Glasgow gasholders will have its capacity increased by about 500,000 feet long before the new holder in Paisley is available for use. While referring to Paisley gas affairs, I may note a very important fact in connection with the lime-revivifying process which the Gas Engineer (Mr. G. R. Hislop), has made so highly successful. The fact in question is that, for the last eleven years, he has not required to calcine any fresh limestone for his purifying operations, as the slaked lime, after it has done its allotted work in the purifiers, is again passed through the patent calcining ovens in which its chemical activity is restored to it afresh. This revivifying of the lime is a prominent feature of the operations carried on at Paisley Gas-Works.

Shortly after mid-day to-day, Messrs. R. and A. Main, of the Argyle Works, Glasgow, along with a number of business and personal friends, and the whole of their workmen and staff, celebrated a "new departure" in their business as manufacturers of gas heating and cooking apparatus. Hitherto, like many other firms in the same branch of business, they have been indebted to foundry firms, chiefly in the Falkirk district, for the small "nutting" and ornamental castings required in the construction of most of their stoves, &c. Henceforth, however, they will be in a position to do all their own ironfounding in the Argyle Works; and the event of to-day was the tapping of the cupola furnace for the first time, and the making of a number of castings for subsequent use, all which was done in a most successful manner. Messrs. Main very handsomely entertained their visitors and workpeople; and success to their business and their undertaking was very cordially pledged. The senior partner of the firm responded in suitable terms.

During the past four days there has been held in Campbeltown, under the auspices of the Corporation Gas Commissioners, a very successful exhibition of gas apparatus. It was organized chiefly with the object of demonstrating the merits and superiority of gas over ordinary coal fires for cooking and heating purposes; and in the accomplishment of this object, the Corporation were ably and effectively seconded by several firms with whom the making of such apparatus is a special branch of business. The exhibition was opened on Tuesday by Provost Colville, who delivered a short appropriate address on the occasion. Messrs. Main, of Glasgow, and Messrs. Milne and Sons, and Messrs. W. and B. Cowan, of Edinburgh, contributed largely to make the exhibition a pronounced success. The great advantages of gas-cooking apparatus were thoroughly demonstrated by Miss Bunden, of the Glasgow School of Cookery. Mr. Robertson, Manager of the Corporation Gas-Works, also did much valuable service prior to and during the exhibition, which is the first thing of the kind yet held in Campbeltown.

In the Court of Session last Wednesday, Lord Trayner heard Counsel on the question of expenses in the action between the Coatbridge Gas Company and the Town Council, in which the complainers sought interdict against the respondents extinguishing the metered lamps in the streets of the burgh in such a way as not to register a correct average of the amount of gas consumed by all the lamps. His Lordship said he had no doubt that interdict should be granted against the respondent Jones, who had acted improperly. Of that there was no doubt; and he (Jones) was to be interdicted from acting improperly again. As to the Town Council, he was of opinion that no interdict should go out against them at all, as he did not think it would be fair to put the Council under the ban of an interdict of the Court, because on one or more occasions their servant behaved improperly, or, as the complainers said, fraudulently. It was right to say that the Council gave no authority to Jones for the improper act which he committed, and that they never adopted or would have adopted Jones's procedure if it had been known to them. But, then, there was no necessity, in any circumstances, for granting interdict against the Council, because, in the month of February last, they commenced with the complainers, and informed them—that was after the Note had been raised—of the instructions which they had given to their lamplighters in order to avoid the very cause of complaint which the complainers made. On Feb. 12 last, the complainers, through their Manager, wrote to the respondents that they had received the letter setting forth the instructions which had been given. Now, there was no suggestion that since Feb. 12 there had been any interference whatever with the metered lamps; and accordingly he took it that the Town Council had issued proper instructions to their servants, and that those instructions had been obeyed. There was no reason to apprehend that the Council would withdraw those instructions, or alter them to the injury of the complainers; and therefore there was no necessity for interdicting them from an act which they distinctly disapproved of, and which was performed without, and contrary to, their instructions. The only question which remained was that of expenses; and that, as in many other cases, bulked as largely as the question on the merits. He thought the Town Council were responsible for the expenses up to the closing of the record; because, in their defences, they made a common defence with Jones, denying the statements upon which the right to interdict was based, and which had turned out to be perfectly right. The record was closed on Feb. 26; but there had been, fourteen days before that, the communication to the complainers of the instructions which the Town Council had given to their lamplighters—instructions which were recognized to be right and proper. On Feb. 12 the complainers might have ceased any further proceedings against the Council. He must say that a good deal of the expense in the case, and certainly the expense of the proof, would have been rendered entirely unnecessary if there had been a little more friendliness between the parties. The action was raised without any notice to the Town Council, or any request to them to put a stop to the practices which were complained of. The first notice they got was the service of the Note. On the whole matter he would grant interdict against Jones as concluded for, and refuse interdict against the Town Council; then he would find the respondents jointly and severally liable in expenses to the date of closing the record, and Jones only liable in expenses after that date.

An interesting lecture on "Gas Economy" was delivered last Tuesday night, under the auspices of the Local Improvement Society of Mount Florida—one of the Glasgow southern suburbs—by Mr. W. Key, Manager of the Tradeston Gas-Works. The experiments shown in illustration of the lecture were very greatly appreciated by the audience.

The Glasgow pig-iron market has again been strong during most of the week. Scotch warrants have fluctuated in price between 43s. 8d. and 44s. 6d.; the market closing yesterday slightly easier. A large amount of business has been reported from day to day. Scotch special brands have been firm in price; and some of the quotations have been advanced during the week. There are now 82 blast furnaces in actual operation, as compared with 87 at this time last year.

A quieter business in the local coal trade has been the rule this week; but prices have shown a hardening tendency. The general quotation for main coal is from 6s. 9d. to 7s. per ton f.o.b. at Glasgow.

THE works of Messrs. R. Dempster and Sons, Limited, of Elland, are now fully employed; the following orders having recently been placed with the firm:—A telescopic gasholder, in two lifts (of 100 feet and 98 feet diameter, and each 28 feet deep), for the Leigh Local Board Gas-Works; a single-lift gasholder, 49 feet in diameter by 16 feet deep, for the St. Anne's-on-the-Sea Gas-Works; a similar holder, 45 feet in diameter by 15 feet deep for the Milton (Kent) Gas-Works; the reconstruction of a 160 feet diameter telescopic holder for the Halifax Corporation; hydraulic main and complete retort-fitting for West Hartlepool; and an entire plant for new gas-works in India.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 23.

Sulphate of Ammonia.—There is very little change in the market beyond the perceptible scarcity of spot parcels, especially noticeable in Scotland. As, in spite of disparaging statements about the market and the position generally, parcels continue to be sold readily, it is needless to say that the transactions show enhanced values all round; and Leith parcels are quite 5s., and Liverpool and Hull parcels about 2s. 6d. per ton dearer. What makes it difficult to understand the present position, or to diagnose the future, is the dulness of the demand both at home and abroad from consumers direct; but a glance at the heavy shipments cannot fail to disclose the fact that the orders have been booked at some time or other by dealers, who therefore at the present moment almost solely represent the buying element. It is, of course, by no means to be taken for granted that consumers will not be purchasers of further quantities this spring. But they seem to have sufficient for present requirements; and the season being undoubtedly a late one, it will probably not be till the end of the present month, or early April, that the direct buying by consumers will be resumed. The falling nitrate values furnish fuel for arguments in favour of a corresponding decline in sulphate; but the very fact that dealers have taken the orders for sulphate, and are bound to supply it, gives security that sulphate rates will not immediately follow in the wake of nitrate. As regards the latter, the early and very heavy arrivals off-coast could not fail to create a dull feeling; and it appears that very close upon 10s. has been accepted by frightened holders. The season, however, is not in full swing yet; and it is barely likely that the consumption will show a falling off against last year.

LONDON, *March* 23.

Tar Products.—Anthracene appears to have relapsed again, after the spurt noted last week. Distillers, however, only hold small stocks, and are very easy about the market. Benzoles are still sick; but the low prices have brought in buyers again. Carbolic acid is scarce; and buyers are keen to secure forward purchases. There is likely to be a scarcity of this article; and as summer advances, higher prices will probably be obtained. Prices: Tar, 18s. to 23s. per ton. Benzol, 90 per cent., 2s. 9d. per gallon; 50/90 per cent., 2s. 2d. per gallon. Toluol, 1s. 5d. per gallon. Solvent naphtha, 1s. 3d. per gallon. Crude naphtha (80 per cent.), 1s. per gallon. Light oil, 3d. per gallon. Creosote, 2d. per gallon. Pitch, 20s. to 23s. per ton, according to position. Carbolic acid (crude), 3s. 10d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 17s. per ton. Anthracene (30 per cent.), "A" quality, 1s. 3d. per unit; "B," 1s. to 1s. 2d. per unit, according to quality.

Ammonia Products.—Sulphate is showing more life; and the home consumption having now set in, a large trade is being done in this direction. German store-houses, it is said, are depleted; and with anything like seasonable weather during the next month or two, large quantities will be required for that market. Prices during the week have ruled between £11 17s. 6d. to £12, with a marked upward inclination. Prices of other products are: Gas liquor (5° Twaddel), 8s. per ton, with a rise or fall of 1s. 6d. per degree. Liquor ammonia, 2d. per lb. Carbonate of ammonia, from 3d. to 4d. per lb. Muriate of ammonia, brown, £19 per ton; white, £25 per ton. Sal-ammoniac, £30 to £33 per ton.

BEAUFORT GASLIGHT COMPANY, LIMITED.—This Company was registered last week with a capital of £2000, in £1 shares, to acquire the gas-works, property, and effects in connection therewith, belonging to Mr. J. J. Bailey, at Beaufort, in the county of Brecon.

OPPOSITION TO THE SOUTH KENT WATER BILL.—A public meeting was held at Marden last Wednesday, to consider the scheme set out in the South Kent Water Bill. It was resolved to oppose the measure, on the ground that the parish had plenty of water within its own boundary.

REDUCTIONS IN PRICE.—It was resolved at the recent annual meeting of the *Market Weighton Gas Company* to allow a discount of 5d. per 1000 cubic feet to private consumers on all gas consumed from the beginning of the year.——On the 1st prox. a reduction of 5d. per 1000 cubic feet will be made in the price charged for gas by the *Wimborne Gas Company*. The price will then stand at 4s. 7d.——The *Halstead Gas Company* have decided to reduce the price of gas by 5d. per 1000 cubic feet as from the 31st inst.——As will be seen from a paragraph in another column, the *Broadstairs Gas Company* have reduced their price as from the end of the March quarter.

HEYWOOD CORPORATION WATER COMMITTEE AND THEIR ENGINEER.—A proposal by the Heywood Corporation Water Committee to specially recognize the additional services rendered by Mr. J. Diggle, Assoc. M. Inst. C.E., the Water Engineer, in connection with the construction of the new Clay Lane Reservoir and other works, has caused "considerable feeling" in the borough. The Committee, it was rumoured, was in favour of granting Mr. Diggle the sum of £600; and a requisition was presented to the Mayor to call a public meeting to consider the matter. This meeting was held on the 11th inst., when Mr. Buckley, the Chairman of the Water Committee, informed the ratepayers present that it had always been an understood thing that Mr. Diggle's services should be paid for at the end of the work. It was now completed; and this payment was recommended in order that the capital account might be closed. He contended that the services of Mr. Diggle had saved the town thousands of pounds; and of the £600 which it was proposed to give him, £150 was for actual expenses out of pocket. A resolution "solemnly protesting" against the proposed honorarium, and calling upon the Town Council not to endorse the Water Committee's recommendation was moved, and agreed to. At a meeting of the Town Council on Thursday week, after a long discussion, £400 was voted to Mr. Diggle—£200 less than was first recommended by the Water Committee.

THE BELFAST CORPORATION AND THE BELFAST WATER BILL.—The Corporation of Belfast have deposited a petition against the Bill promoted by the Belfast Water Commissioners to obtain authority for the construction of additional works and for other purposes. Among the clauses specially objected to by the Corporation are two dealing with the charge for water. By clause 78 it is proposed to enact that if any person supplied with water by the Commissioners, or liable to the water-rate, or for the payment of any sum for water supplied for other than domestic purposes, neglects to pay such rate or sum, the Commissioners may stop the supply of water. The Corporation submit that any such power is one which might cause considerable hardship unless its exercise is controlled by proper provisions as to notice and otherwise. Further, in a large part of the city the water-rate in respect of houses (especially those occupied by the labouring and poorer classes) is payable by the owner or lessee, and not by the occupier; and considerable hardship might, the Corporation think, be inflicted upon occupiers of such houses if the Commissioners were empowered to cut off the water supply thereto without any notice, by reason of the neglect of the owner to pay the water-rate, and the Corporation are advised that such an extension of the powers for cutting off water as is proposed is contrary to the principles which have guided the Legislature in dealing with recent Water Acts.

MALVERN GAS AND WATER WORKS.—The Malvern Local Board resolved last Tuesday to make an application to the Local Government Board for sanction to a loan of £7000 to be expended as follows:—Extension of gas-works, £3000; extension of water-works, £2700; street improvements, £1300.

THE STRIKE AT THE HALIFAX GAS-WORKS.—There is not much fresh to record in connection with the strike at the Halifax Gas-Works. Most of the places vacated by the men on strike have been filled up, and the make of gas is being effectively proceeded with; the result being an improvement in the quality. A requisition is in course of signature by the sympathizers with the strikers, asking the Mayor to call a town's meeting on the subject. A serious occurrence took place on Saturday evening last. Three of the new men, who, it will be remembered, are lodged in the works, ventured into the town at a late hour, and one of them, named Robinson, from York, was waylaid by Walton, a stoker on strike, and so terribly assaulted that his life is despaired of. He had not regained consciousness last evening. Walton is in custody.

PROPOSED DRAINAGE SCHEME FOR MARGATE.—Mr. Arnold Taylor has lately been holding an inquiry, extending over several days, at Margate, in regard to a proposal made to the Local Government Board, by the Corporation of that town, to carry out an extensive drainage scheme, which has been prepared for them by Mr. Baldwin Latham, M. Inst. C.E. A high and a low level system of sewers are proposed, the contents of which, when united by pumping, will be conducted in a tunnel two miles long, and at a great depth, through the chalk hills and cliffs to a point of outfall not far from the North Foreland. Here it is expected that the strong tides will effectually carry away the sewage, so that it will give no further trouble. The cost is estimated at between £50,000 and £60,000; and the scheme has the support of Sir F. Bramwell, Sir Douglas Galton, Mr. G. Chatterton, and other engineers. The opponents of the scheme contend that, whatever may be the necessities of town drainage, it will be a mistake for a watering-place, dependent on the attractions of sea and air, visibly to make the water dirty by turning sewage into it, and to foul the air by vapours arising from long flat sewers. The opponents, supported by Professor Robinson, Mr. Bailey Denton, Mr. Shone, Major Flower, Mr. Abernethy, and other gentlemen of wide experience, contend that the point of discharge proposed by the Corporation is unsuitable, owing to the action of the tides and currents. An alternative scheme was submitted; but the Inspector could not entertain it. There is considerable difference of opinion on the matter in the town; and the decision of the Local Government Board is anxiously awaited.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 569.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d
590,000	10	12 Oct.	10½	Alliance & Dublin 10 p. c.	10	19—20	+½	5 5 0
100,000	10	,,	7½	Do. 7 p. c.	10	13—14	..	5 7 2
800,000	100	2 Jan.	5	Australian (Sydney) 5% Deb.	100	110—112	..	4 9 5
100,000	20	29 Nov.	10	Bahia, Limited	20	24—26	..	7 13 10
200,000	5	14 Nov.	7½	Bombay, Limited	5	6¾—7¼	..	5 3 8
40,000	5	,,	7½	Do. New	4	5¾—5¾	..	5 4 2
380,000	Stck.	14 Feb.	11½	Brentford Consolidated	100	224—229	..	5 2 7
125,000	,,	,,	8½	Do. New	100	164—169	..	5 3 7
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	42—44*	..	4 15 5
320,000	20	28 Sept.	11½	British	20	46—48	..	4 18 9
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	19—21*	..	5 4 9
89,000	10	,,	8	Do. 7 p. c.	10	13—14*	..	5 14 3
328,750	10	14 Nov.	8	Buenos Ayres (New) Limited	10	14—15	−½	5 6 8
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	107—110	..	5 9 1
150,000	20	28 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	12 Oct.	13½	Commercial, Old Stock	100	368—378	..	5 0 8
180,000	,,	,,	10½	Do. New do.	100	215—220	..	4 17 9
180,000	,,	28 Dec.	4½	Do. 4½ p. c. Deb. do.	100	103—108	..	3 10 3
557,320	20	13 Dec.	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	,,	10	Do. New '69 & '72	14	32—34	−2	5 6 7
200,000	20	,,	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Sept.	10	Crystal Palace District	100	205—215	..	4 18 0
234,060	10	30 Jan.	15	European, Limited	10	25½—26½	..	4 18 1
120,000	10	,,	13	Do. New.	5	7¾ 18—19	..	5 2 7
354,060	10	,,	13	Do. do.	5	12—13	..	5 0 0
5,468,600	Stck.	14 Feb.	13	Gaslight & Coke, A, Ordinary	100	254—258	..	5 0 10
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	99—104	..	3 16 11
655,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	260—265	..	3 15 6
80,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	180—185	..	4 1 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	170—175	..	4 0 0
468,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	258—263	..	3 16 1
1,031,150	,,	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	125—130	..	3 9 3
650,000	,,	,,	6	Do. 6 p. c. do.	100	174—179	..	3 7 0
3,600,000	Stck.	14 Nov.	10	Imperial Continental	100	209—212	..	4 14 4
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd	5	5—5¼	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p.c. Deb.	100	115—117	..	4 5 6
541,920	20	29 Nov.	6	Monte Video, Limited	20	18¾—19½	..	6 3 1
150,000	5	29 Nov.	10	Oriental, Limited	5	9¼—9¾	..	5 2 7
60,000	5	28 Sept.	7	Ottoman, Limited	5	6—7	..	5 0 0
166,870	10	16 Jan.	4	Pará, Limited	10	5¼—6	..	6 13 4
420,000	100	2 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	104—107	..	5 12 1
500,000	100	1 Dec.	6	2nd Do.	100	95—100	..	6 0 0
100,000	10	12 Oct.	10	San Paulo, Limited	10	16—18½	..	5 11 1
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	314—319	..	5 1 11
1,350,000	,,	,,	12½	Do. B do.	100	238—242	..	5 0 3
141,500	,,	,,	13½	Do. C do.	100	255—265	..	5 0 0
600,000	,,	28 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—140	..	3 11 5
60,000	5	28 Feb.	11½	Tottenham & Edm'ntn, Orig.	5	11—13 *Ex div	..	4 8 5
				WATER COMPANIES.				
717,467	Stck.	28 Dec.	9	Chelsea, Ordinary	100	259—264	..	3 8 2
1,730,560	Stck.	12 Oct.	7½†	East London, Ordinary	100	210—214	−1	3 10 1
700,000	50	13 Dec.	9	Grand Junction	50	122—126	..	3 11 5
708,000	Stck.	14 Feb.	10½	Kent	100	272—277	..	3 15 9
1,048,800	100	28 Dec.	9	Lambeth, 10 p. c. max.	100	253—257	−1½	3 10 0
406,200	100	,,	7½	Do. 7½ p. c. max.	100	199—204	..	3 13 6
200,000	Stck.	28 Sept.	4	Do. 4 p. c. Deb. Stk.	100	119—123	..	3 5 0
500,000	100	14 Feb.	12½	New River, New Shares	100	350—360	..	3 7 4
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	125—128	+2	3 2 6
902,300	Stck.	13 Dec.	5	S'thwk & V'xhall, 10 p.c. max.	100	170—175	+1	3 8 6
126,500	100	,,	6	Do. 7½ p. c. do.	100	160—165	..	3 12 9
1,155,066	Stck.	,,	10	West Middlesex	100	264—269	..	3 14 4

† Next dividend will be at this rate.

An Electric Light Experiment at Reading.—On Saturday, the 16th inst., an experiment in electric lighting was started at Reading by Messrs. Laing, Wharton, and Down, of London, with the consent of the Corporation of the borough. The portions of the town selected for the trial are the Market Place, Broad Street, Friar Street, and Duke Street.

Neglecting to Provide for a Constant Water Supply.—At the Lambeth Police Court, last Thursday, Mr. Watson, of Bowdale Road, East Dulwich, was summoned, on behalf of the Southwark and Vauxhall Water Company for failing to provide proper fittings for the constant water supply, whereby he had rendered himself liable to a penalty of £5. It was shown that the fittings upon the property owned by the defendant were totally inadequate for the constant supply, and that waste resulted. Promises had frequently been made by the defendant to comply with the provisions of the Act, but up to this time nothing whatever had been done. There was no desire on the part of the Company to press for penalties. All that was wanted was that the work should be done to their satisfaction. The defendant, in answer to the complaint, said that he was quite willing to carry out the necessary work, but required time. Ultimately he undertook to do the work if the case was adjourned for a fortnight. This was agreed to.

The Oil Lighting at Erith.—In the course of a letter to a local paper, accompanying a copy of his communication to the Journal a fortnight ago, Mr. R. P. Keys again attacks the oil lighting at Erith. He says: "Mr. Defries at first disputed my statement; but the facts have accumulated so fast lately, corroborating every line that I wrote, that circumstances have led me to return to the subject much earlier than I intended to have done. Our English winters are against oil public lighting; and the ladies are against the nasty greasy oil lamp-columns, and equally opposed to the odoriferous oil-cans everlastingly to be met with on the pavement—Sundays and week-days. The greasy ladders, the oily asphalte, and the greasy men are too much for them. The Defries Company may possibly be able to struggle through their contract period; but at this date it is my deep conviction that the ratepayers of Erith will have had enough of it, and the Local Board more than enough, by the time that the contract expires. The lamp is a beautiful one *when it is alight;* but 'there is the rub.' What is the use of a beautiful lamp if you cannot keep it alight when you want it in the winter? My contention is that gas has proved itself practically reliable during our English winters, and oil-lamps, according to the official report of the Erith Local Board, have failed to the number of 292 during this winter. Mr. Defries may persevere; but I think the English winters and the ladies will be more than a match for his system." Mr. J. Barrett, of Carshalton, has forwarded to another local paper a sketch and description of a telescopic lamp-post, by means of which the lamp can be brought down to within a few feet of the ground, so as to obviate the use of ladders, which have proved to be impediments to the rapid lighting of the oil-lamps at Erith.

Broadstairs Gas Company.—In the report of the Directors of this Company presented to the stockholders at their meeting on the 5th inst., they stated that the balance of the profit and loss account was £1973 17s. 8d., out of which they recommended dividends at the rate of 10, 7, and 5 per cent. per annum on the various classes of capital. Notwithstanding the reduction of 3d. per 1000 cubic feet at the beginning of 1888, the profit on the year's working was only £8 5s. 7d. less than in 1887. This is in a great measure creditable to the careful supervision of the Secretary and Manager (Mr. W. J. Latchford). The Directors have now resolved to reduce the price from 3s. 9d. to 3s. 6d. per 1000 cubic feet after the March quarter.

Sales of Shares.—On Wednesday last, at the Auction Mart, Tokenhouse Yard, Messrs. Fox and Bousfield sold by auction the following stock and shares:—259 £10 "A" Ordinary fully paid shares (maximum dividend 10 per cent.) in the *Hampton Court Gas Company*, of which 20 realized £22 per share; 49, £21 10s.; 20, £21 5s.; and 170, £21. Also 203 £10 "B" Ordinary fully paid shares (maximum dividend 7 per cent.) in the same Company; 93 of these were sold at £15 10s. per share, and 110, at £15. At the same sale £300 of 3½ per cent. preference stock in the *Northfleet and Greenhithe Gas Company, Limited*, changed hands at £92 per £100 of stock; and 5 ordinary £10 shares in the *Grays' Gas Company* realized £20 per share.——On the same day there was an extensive sale of shares at Stalybridge, and included in the lots were seven "B" shares in the *Littleborough Gas Company* (£10 each), on which £8 had been called up. Biddings commenced at £12, and proceeded rapidly until £20 each was reached.——On the following day, Messrs. Tootell sold by auction, at Maidstone, £666 of the *Maidstone Gas Company's* stock, at an average of £235 10s. per cent.

Oil *v.* Gas Lighting in the Bolton District.—Owing to a difficulty which has arisen between the Bolton Town Council and the Rural Sanitary Authority about the amount of the guarantee to be paid for any extension of the mains for the supply of certain districts with gas, the latter body have resolved to try oil lighting. At the last meeting of the Rural Sanitary Authority, the Lighting Committee recommended that, in consequence of the heavy payment required by the Gas Committee of the Bolton Corporation for the extension of the mains to Belmont, four brackets be put up in that township, and fitted with "Wanzer" oil-lamps; also that four similar lamps should be fixed in Harwood Vale Road. The Committee's recommendation was adopted, and the lamps ordered. Should they prove a success, it is intended to erect others in the district. Some years ago, the Rural Sanitary Authority tried oil lighting in their district; but it did not answer. The members now argue, however, that there has been a decided improvement in oil-lamps since then, and another trial might be more successful. About 18 months ago the Westhoughton Local Board tried oil lighting in the public streets; but it was a failure, and a return was made to gas.

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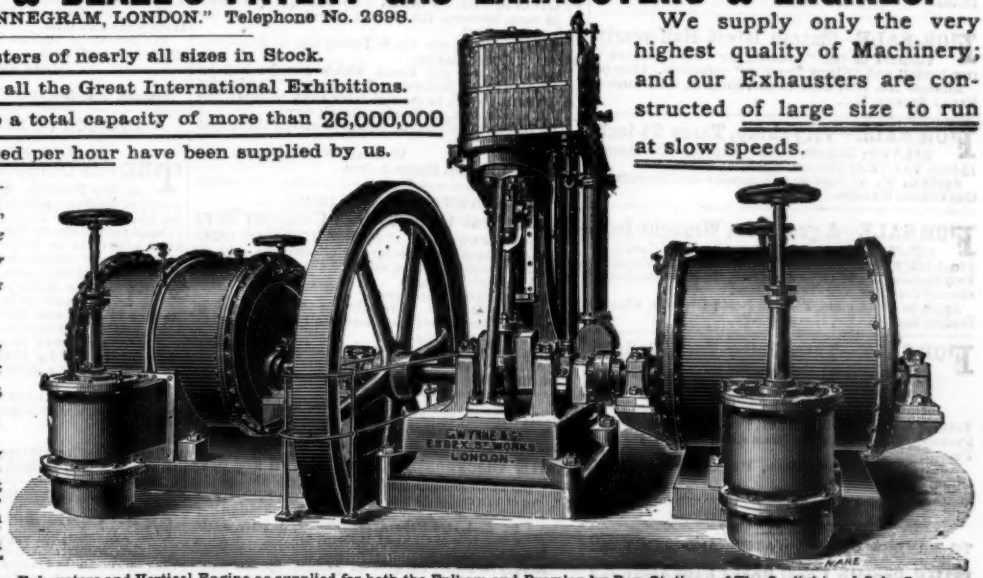

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*** See Advertisement on Page III. of the Wrapper of this week's issue.

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*** See Advertisement p. 550 of last week's issue.

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FOR SALE—Very cheap, Three 24-inch VALVES; Makers, Vickary and Co. Also Seven 12-inch VALVES; Makers, Willey and Co.
Apply to W. A. PADFIELD, Engineer and Secretary, Gas Offices, EXETER.

FOR SALE—A good stout Wrought-Iron OIL-TANK, 7000 gallons, and three Cast-Iron 4-inch SOCKET ROSIN STILL WORMS, with Wrought-Iron Standards and Clips complete. To be immediately cleared for alterations of premises.
Apply to F. MORRIS, Tar and Rosin Distiller, Plough Bridge, Rotherhithe, LONDON, S.E.

FOR SALE—Three Boiler-Tanks in first-class condition; sizes about
29 ft. 9 in. by 9 ft.
26 „ 0 „ by 9 „
23 „ 6 „ by 7 „
Several Waggon Boiler-Tanks, Two Anthracene Filter Presses, Cisterns, Two Steam-Pumps, also Ram Pumps.
Address CULPAN AND SONS, Heckmondwike, YORKSHIRE.

EXHIBITION AT PENRITH.

TO MAKERS OF GAS, WATER, AND SANITARY APPLIANCES.

THE Penrith Local Board have arranged to hold in Penrith, on May 8, 9, 10, and 11 next, an EXHIBITION OF GAS, WATER, and SANITARY APPLIANCES.
Applications for space, with full particulars of proposed Exhibits, should be sent to the undersigned not later than the 17th of April next. (All space for Gas Cooking and Heating Stoves already taken up.)
By order,
GEORGE WAINWRIGHT, Clerk.
Public Offices, Penrith, March 22, 1889.

FOR SALE, Cheap—Four Purifiers in a group 16 ft. by 12 ft. by 3 ft. 9 in. deep, with Centre-Valve and Connections (12-inch) complete. Practically equal to new.
Apply to SAMUEL WHILE, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE—A pair of Exhausters with Hydraulic Bye-Pass; at present working upon the Bingley Gas-Works. Capacity of each Exhauster 12,000 cubic feet per hour.
The above-mentioned Exhausters will be ready for disposal next June, when they will be superseded by others of greater capacity.
Tenders for the purchase of the same to be addressed to the Chairman of the Gas Committee.
By order,
GEORGE DUNBAR MALAM,
Engineer.
Bingley, March 19, 1889.

CROYDON.

SALE OF 287 GAS AND BREWERY SHARES.

ROBT. W. FULLER, MOON, & FULLER have received instructions to Sell by auction at the Greyhound Hotel, on Thursday, April 11, at Five for Six o'clock, 287 SHARES, including 237 SHARES in the CROYDON COMMERCIAL GAS AND COKE COMPANY, of £5 each, all fully paid up, and paying Dividends at the rate of 11 per cent., also 50 6 per cent. PREFERENCE SHARES of £10 each in NALDER AND COLLYER'S BREWERY COMPANY, LD.
Particulars of any other Shares to be included in the above Sale should be forwarded to the Auctioneers by the 28th inst.
Auction and Estate Agency Offices, Croydon, Reigate, and Epsom.

GLASGOW CORPORATION GAS.

THE Glasgow Corporation Gas Commissioners invite TENDERS for the supply of such METERS (Dry and Wet) as they may require for Twelve months, from the 1st of May, 1889.
Forms of tender may be had on application to the Manager, at the Gas Office, 42, Virginia Street, Glasgow.
Sealed offers, addressed to the Subscriber, and marked "Tender for Meters," will be received at the Gas Office, 42, Virginia Street, Glasgow, on or before Tuesday, the 9th of April, 1889.
The Commissioners do not bind themselves to accept the lowest or any tender.
J. D. MARWICK, Town Clerk.
City Chambers, Glasgow, March 19, 1889.

THE Directors of the Farnham Gas Company, Limited, invite TENDERS for the Supply and Delivery of 500 tons of the Best NEW PELTON or PELAW MAIN GAS COAL, in quantities of 50 tons, between the 31st of March inst., and the 30th of June next.
The price to be per ton delivered free at Farnham, Surrey, Railway Station.
Sealed tenders (on forms which can be had on application to the undersigned), endorsed "Tender for Coal," to be sent in to me not later than Monday, the 25th of March inst., at Twelve o'clock noon.
The Directors will not be bound to accept the lowest or any tender.
WILLIAM WELLS, Secretary.
Farnham, Surrey, March 5, 1889.

SPENT OXIDE OF IRON.

THE Great Grimsby Gas Company have on offer a quantity of SPENT OXIDE OF IRON ready for immediate delivery, which may be seen, or samples approximate in quality of the lot will be forwarded on application.
Payment, cash on delivery.
The Company will undertake to deliver free in waggons on the Great Northern Railway Company's Sidings, Great Grimsby.
Further particulars may be obtained on application to the undersigned.
The highest or any tender not of necessity accepted.
JAMES JOWETT,
Engineer and Manager.
Great Grimsby Gas-Works,
March 22, 1889.

THE Cleckheaton Local Board are prepared to receive TENDERS for the Supply and Fixing of the under-named GAS APPARATUS, viz.:—
Exhauster and Engine combined, with Compensator and Bye-Pass Arrangement, to pass 30,000 cubic feet of Gas per Hour.
Two Disc Valves.
Rotary Washer, capable of passing 500,000 cubic feet of Gas per diem.
Any further information to be had from Mr. Niven, the Board's Gas Engineer.
Tenders, properly endorsed, to be deposited with the undersigned before Four o'clock p.m. on Monday, the 1st day of April next.
The lowest or any tender will not necessarily be accepted.
By order,
J. ARMITAGE, Clerk.
Cleckheaton, March 12, 1889.

CORPORATION OF WARRINGTON.

THE Gas Committee are prepared to receive TENDERS for the RENEWAL of two TELESCOPIC GASHOLDERS about 60 feet diameter.
Also for FIRE-CLAY, BRICKS, &c., CAST-IRON MAINS, and SPECIAL CASTINGS.
For particulars apply to Mr. Wm. S. Haddock, Engineer to the Department.
FREDK. TAYLOR, Secretary.
Gas Offices, Warrington, March 18, 1889.

SCARBOROUGH GAS COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Scarborough Gas Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR and surplus TAR produced at their Works for One year, from the 16th day of April next.
Conditions of tender and necessary particulars will be supplied on application to the undersigned, to whom tenders, in accordance with such conditions, and properly endorsed, must be delivered not later than Noon on Monday, the 8th day of April next.
By order,
WILLIAM J. MOON,
Secretary and Manager.
Gas Offices, Scarborough, March 15, 1889.

STAINES AND EGHAM DISTRICT GAS AND COKE COMPANY, LIMITED.

THE Directors of this Company invite TENDERS for the purchase of the whole of the AMMONIACAL LIQUOR and surplus TAR produced at their Works for One, Two, or Three years.
The Tenders to state the price per butt of 108 gallons for Liquor of 10 oz., 12 oz., and 14 oz. Twaddel; and the price per gallon for Tar.
Both the Liquor and Tar will be pumped by the Company's Engines into the Contractor's Barge alongside the Company's Wharf.
Full particulars may be obtained of Mr. T. Webb, the Manager at the Works.
Tenders to be sent on or before the 2nd of April next to the undersigned.
JOHN ANTHONY ENGALL,
Solicitor and Secretary.
Staines, March 8, 1889.

STAINES AND EGHAM DISTRICT GAS AND COKE COMPANY, LIMITED.

THE Directors of this Company invite TENDERS for the supply and delivery of 6000 tons of EAST PONTOP or PELAW MAIN and YORKSHIRE SILKSTONE GAS COALS per annum for One, Two, or Three years, in quantities per Month as ordered by the Company's Manager. The year will commence on the 1st of October, and end on the following 30th of September.
The Company's Works are on the banks of the Thames, and outside the City Coal Dues boundary.
The Coals must be thoroughly screened, and free from Slate and Bats.
Tenders to be sent to the undersigned on or before the 2nd of April next.
JOHN ANTHONY ENGALL,
Solicitor and Secretary.
Staines, March 8, 1889.

BOROUGH OF BURTON-UPON-TRENT.

TO COLLIERY PROPRIETORS.

THE Gas Committee of the Corporation of the Borough of Burton-upon-Trent are prepared to receive TENDERS from Colliery Proprietors for the supply of from One to Ten Thousand Tons (Twenty-one cwts. to the Ton) of BEST SCREENED GAS COAL, to be delivered in Sender's or Railway Company's Trucks at the Gas-Works, Railway Siding, Burton-upon-Trent, between the 1st day of April next and the 31st day of March, 1890.
The deliveries are to be made in such quantities and at such times as may be directed by the Manager.
Payments: Net cash monthly.
Tenders, enclosed in an envelope, sealed and endorsed "Tender for Coal," are to be delivered to me at or before Ten a.m. on Saturday, the 30th of March inst.
The Committee reserve to themselves the right of rejecting the lowest or any tender.
F. L. RAMSDEN,
Manager and Engineer.
Gas-Works, Burton-upon-Trent,
March 13, 1889.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Invention may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

SIXTH YEAR. Now Ready (Demy 8vo., Price 5s., or 5s. 6d. post free),

THE COMPLETE REPORTS OF THE PROCEEDINGS
OF THE VARIOUS
DISTRICT ASSOCIATIONS OF GAS MANAGERS
FOR 1888.

FORMING A COMPANION VOLUME TO THE TRANSACTIONS OF THE GAS INSTITUTE, WITH WHICH IT IS UNIFORM IN SIZE.
. THE VOLUMES for 1883 to 1887 ARE STILL ON SALE.

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TROTTER, HAINES, & CORBETT,

BRETTELLS' ESTATE

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK,

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAYS.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

FIRE-BRICKS. FIRE-CLAY.

JAMES WHITE & CO.,

Albert Oil-Works,

WIDNES, LANCASHIRE.

Sole Proprietors of the Largest and Purest Beds of Fire-Clay in England.

FOR GAS FURNACES our GANNISTER and SILICA FIRE-BRICKS are acknowledged to be the best and most durable in the market.

GANNISTER and SILICA FIRE-CLAY guaranteed of the Purest and Finest Quality.

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THE ONLY RELIABLE

DRY CENTRE-VALVE.

WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.

ALSO MADE FOR TWO OR THREE PURIFIERS.

No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.

Write for Prospectus.

ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.

F. WECK, 86, NEW STREET, BIRMINGHAM.

THOMAS TURTON AND SONS, LIMITED,

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SHEFFIELD,

MANUFACTURERS OF

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STEEL OF ALL DESCRIPTIONS.

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TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13 155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

For Prices and complete Analysis, apply to

YOUNG, DANCE, & CO.,

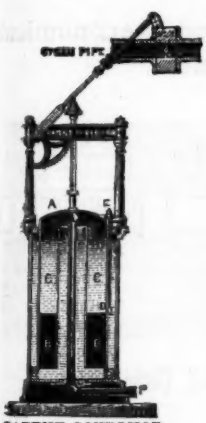
COAL OWNERS, NEWCASTLE-ON-TYNE,

Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

GEORGE WALLER & Co.'s NEW PATENT EXHAUSTER.

MADE WITH FOUR OR THREE BLADES.

Also BEALE'S EXHAUSTERS.



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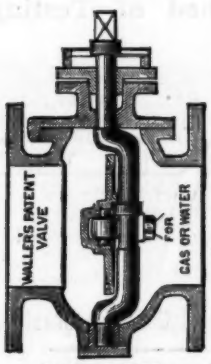

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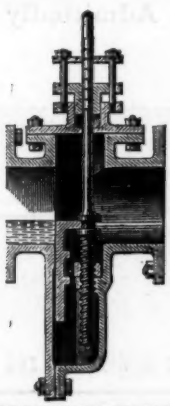

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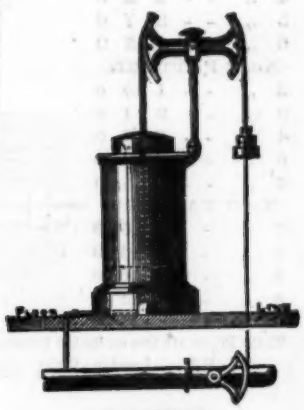

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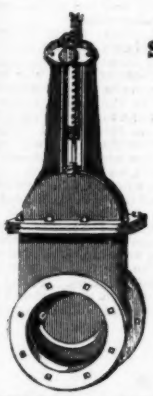

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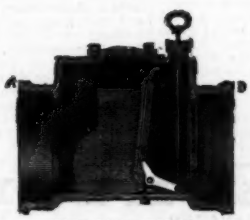

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NEAR SOUTHWARK BRIDGE (FOUR MINUTES FROM HOLLAND STREET), AND AT

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TELESCOPIC EXTENSION LADDERS & STEPS. All sizes, many patterns, large stock for all purposes, indoor and outdoor. Admirable inventions.

HEATHMAN & CO.,
2, Endell St., & 11, High St., Bloomsbury, London, W.C.

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(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

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NEWBATTLE CANNEL.
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GAS AND WATER PIPES.
1¼ to 12 IN. BORE.

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Prices and Analysis of all the Scotch Cannels on application.

GAS COAL.
POPE & PEARSON, LTD., have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12¼ cwt. of good coke.
This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

PRICES.

		£	s.	d.
No. 1 PATTERN. Boxes for Mains.				
2 ins.	- -	1	13	0
3 „	- -	1	14	7
4 „	- -	2	2	6
5 „	- -	2	7	6
6 „	- -	2	15	0
No. 2 PATTERN.				
2 „	- -	1	19	6
3 „	- -	2	1	6
4 „	- -	2	9	0
5 „	- -	2	17	0
6 „	- -	3	5	0
No. 3 PATTERN.				
2 „	- -	1	15	6
3 „	- -	1	16	9
4 „	- -	2	6	9
5 „	- -	2	11	3
6 „	- -	2	18	6

Theso Prices are free on Rail in London.

LYON'S (J. H.)
"Combination Syphon and Test Boxes."
Admittedly the most expeditious and economical method of Testing Mains.

N.B.—Larger Sizes quoted for on application, and Special Quotations for Quantities exceeding Three Boxes.

TESTIMONIALS.

Mr. E. E. PHILLIPS, Manager of the High Wycombe Gaslight and Coke Company, writing on Sept. 17, 1887, says: "I have much pleasure in stating that, in my estimation, your improved Syphon-Boxes are of *great assistance in main-testing*. I have fixed them in positions that I should have used ordinary syphons. They answer very satisfactorily either as syphons or for the purpose of testing mains."

Mr. F. G. DEXTER, Manager of the Wantage Town Commissioners' Gas-Works, writing on Feb. 5, 1889, says: "I have pleasure in stating that I consider your arrangement for Syphons *the best in the market. Their utility in main-laying and testing is unquestionable*, and *vastly superior* to any arrangement of valves with their attendant risks of setting fast. I have adopted the plan of running a neighbouring lamp service through the cover to a few inches below the division, to act as a 'tell-tale.' You will receive further orders whenever opportunity offers."

Mr. GEO. LANE, Engineer and Manager of the Aylesbury Gas Company's Works, in a letter dated Feb. 5, 1889, says: "The Combination Syphon and Test-Box which I had from you some time since, and which was fixed at the Works of the Wendover Gas Company, is *giving entire satisfaction*. I can only say that it fulfils all the purposes for which it has been designed; and I therefore have great pleasure in bearing testimony to the efficiency of it."

Mr. S. CARPENTER, Engineer and Manager of the Dorking Gas Company, writing on Feb. 12, 1889, says: "In answer to your inquiry *re* the Combination Syphon Test-Box, the fact of my sending you a second order, I think, speaks for itself; and I intend in all future extensions to use the Box, as by its adoption *gas-mains may be tested in a few minutes*, which by the old system would take hours."

Mr. GEO. E. WOODEFORD, Secretary of the Ruabon Gas-Works, writing on March 15, 1889, says: "I have put in your Test and Syphon Boxes at Barmouth, and find them *convenient for testing* the mains; more particularly so at Barmouth—a place frequented by visitors all the year round, and where the Local Board are so much averse to the streets being disturbed. Before putting in the Boxes, it was necessary to give the Surveyor seven days' notice before the street could be touched; but now I have only to remove the cover and attach the meter or indicator."

Mr. A. THOMAS, Manager of the Cowes Gas-Works, writing on March 16, 1889, says: "Respecting your Patent Syphon-Box for testing mains, I beg to say that, having used them for three years, my opinion is they are equal to the ordinary Syphon as a Syphon; *nothing can be better for testing mains*; they are *also an excellent valve when repairing or extending mains*."

Mr. W. C. BURLEY, the Secretary of the Petersfield Gas Company, writing on March 18, 1889, says: "In reply to your letter *re* your Combination Syphon and Test Boxes, I consider the fact that I am now having *three more Boxes fixed* to the mains here, in addition to the four already attached to the mains, is the best testimony I can possibly give as to my opinion of their utility. I may add that the other day I wished to ascertain approximately the condition of two sections of main to which your Boxes are attached—viz., the 8 inch main in Lavant Street, and the 2-inch main in Golden Ball Street; and as your Combination Syphon and Test Boxes are attached to these mains, and have hydrant covers, as shown in the diagram in your descriptive circular, I was enabled to test both lengths with the aid of Thorp's Leak Indicator in less time than, under the old method, would have been occupied in opening the ground, saying nothing of the expense of making the necessary connections. To my mind your Boxes ought to command a good sale, as when once attached they save labour, time, and material in every future test."

JOHN HENRY LYON,
GAS-WORKS LESSEE AND MANAGER,
THE RETREAT, COSHAM, HANTS.;
OR TO
Messrs. D. M. NELSON & SONS, 164, St. Vincent Street, Glasgow; Mr. R. L. KERR, Engineer, 41, John Dalton Street, Manchester; The THAMES BANK IRON COMPANY, Upper Ground Street, London; Mr. RAFAREL, Engineer, Barnstaple.

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ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

"TEST PAPERS"
FOR GAS, ETC., PREPARED BY
R. D. GIBBS, Summerfield Crescent, Birmingham.

VALUATION OF COAL
FOR GAS MAKING, ETC.
Estimation of (1) Moisture, 1s.; (2) Volatile Matter, 1s. (3) Coke, 1s.; (4) Permanent Gases, 2s. 6d.; (5) Ash, 1s.; (6) Ammonia Capacity, 2s.; (7) Carbon, 1s. 6d.; (8) Sulphur, 2s. 6d. 1, 2, and 3 = 2s. 6d.; 1, 3, and 4 = 4s. Complete Combustion, 10s. 6d.
Five Samples submitted at same time to secure above Rate.
Estimation of Ammoniacal Liquor, 2s. 6d.; Oxide, for Active Iron, 2s.; for Sulphur, 3s.
R. D. GIBBS, Ph. Ch., Summerfield Crescent, Birmingham.

LUX'S GAS-BALANCE.
(For Description, see JOURNAL OF GAS LIGHTING, July 17, 1888.)
For the Automatic Determination of the Specific Gravity and the Composition of Gases.
Patented in Great Britain and Abroad.
SOLE AGENTS FOR THE UNITED KINGDOM:
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Now offer their superior
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LANEMARK CANNEL.
Yield of Gas per ton . . 10,880 cub. ft.
Illuminating Power . . 29·21 candles.
Coke per ton . . . . 1266·96 lbs.
LANEMARK GAS COAL.
Yield of Gas per ton . . 11,379 cub. ft.
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Coke per ton . . . . 1285·53 lbs.
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Yield of Gas per ton . . 10,784 cub. ft.
Illuminating Power . . 22·70 candles.
Coke per ton . . . . . 1320 lbs.
For Prices and Analyses, apply to
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TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

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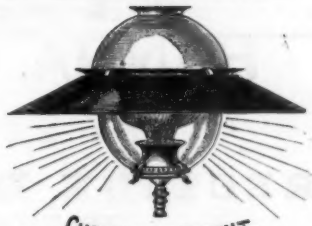
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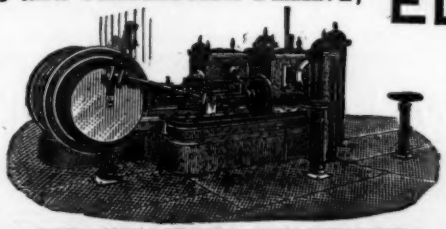
SUITABLE FOR EVERY FORM OF LIGHTING.
A beautiful white light from ordinary Gas. Silent, steady, and economical.
PACKED IN BOX 9s., SUBJECT.
S. CHANDLER & SONS,
Central Works, Kennington Oval, S.E.

CAST-IRON PIPES
FOR GAS AND WATER.
VALVES
FOR GAS, WATER, AND STEAM.
TELEGRAMS: "PIPES GLASGOW."
WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

JOHN BROWN & CO., LIMITED,
ATLAS STEEL AND IRON WORKS, SHEFFIELD,
ALDWARKE MAIN GAS COAL.
This Coal yields 12,600 feet of 19-candle gas per ton.
Weight of illuminating matter in pounds of sperm, 820·80. Very free from impurities.

CAST-IRON PIPES, ETC.
THOMAS SPITTLE, LTD.
[ESTABLISHED OVER 50 YEARS.]
CAMBRIAN FOUNDRY, NEWPORT, MON.,
MAKERS OF
CAST-IRON PIPES FOR GAS, WATER, AND STEAM;
ALSO
Retorts, Mouthpieces, Lamp-Posts, Hydraulic Mains, H-Pipes, Dip-Pipes, Buckstaves, Ash-pans, Sight-Holes, Syphons, Ascension-Pipes, Fire Doors and Frames, Fire-Bars, Hydrants, Valves, Purifiers, Tanks, Columns, &c., &c.
ALSO ALL WROUGHT-IRON WORK.
THE LARGEST MAKERS IN WALES.

R. DEMPSTER & SONS, LIMITED.,
MANUFACTURERS of GAS and CHEMICAL PLANT, ELLAND, YORKS.

VALVES OF ALL DESCRIPTIONS AND FOR ALL PURPOSES.
LARGE STOCK KEPT.

DIRECT-ACTING RECIPROCATING EXHAUSTERS.

ALL VALVES TESTED TO 40lbs. AND FLANGES FACED.
Prompt delivery guaranteed.
MAKERS OF LIVESEY'S PATENT WASHERS FOR THE COLONIES AND ABROAD.

BEST
GAS COAL.
REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
NEAR BARNSLEY, SOUTH YORKSHIRE.

Glass-House Furnace Bricks.
BLAST-FURNACE BRICKS.
Best Staffordshire Blue Bricks.

Please address "MOBBERLEY & PERRY, STOURBRIDGE," as there are other Firms similar in name.

FIRE BRICKS · GAS RETORTS
LARGE STOCKS ON HAND
SILICA BRICKS & BLOCKS FOR INTENSE HEATS
CASTINGS & EVERY REQUISITE FOR GAS WORKS
LARGE STOCKS ON HAND
MOBBERLEY & PERRY
STOURBRIDGE
SPECIAL BRICKS FOR SECONDARY AIR SUPPLY & REGENERATOR FURNACES
EXPERIENCED RETORT SETTERS SENT TO ALL PARTS OF THE KINGDOM

BLOCKS, LUMPS, AND TILES,
Boiler Seatings, and Flue Covers.
Best Glass-House Pot & Crucible Clay

Please address "MOBBERLEY & PERRY, STOURBRIDGE," as there are other Firms similar in name.

HANNA, DONALD, & WILSON,
(ESTABLISHED 1851)
GAS ENGINEERS & CONTRACTORS
FOR THE
ERECTION OF GAS AND WATER WORKS,
TELESCOPIC AND SINGLE-LIFT GASHOLDERS,
CAST AND WROUGHT IRON GASHOLDER-TANKS,
IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,
PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,
TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.

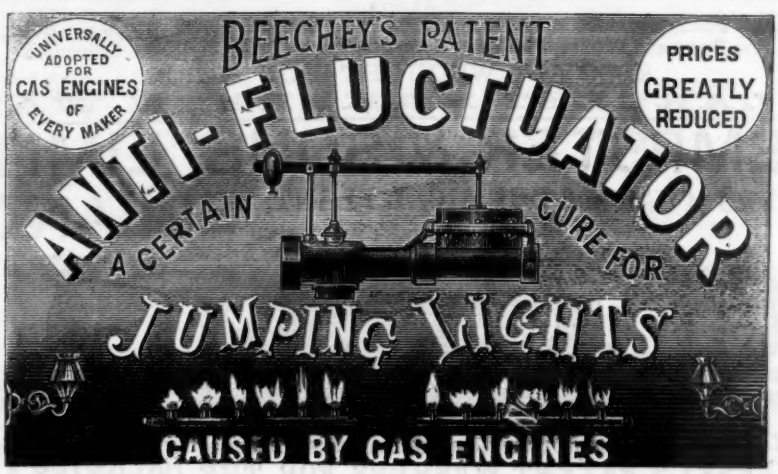
DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

LONDON OFFICE: 9, FENCHURCH STREET, E.C.
ABERCORN FOUNDRY & ABBEY WORKS, PAISLEY, N.B.

ESTABLISHED 1825.
GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF
IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES
FOR ANY PURPOSE.

Price Lists AND Full Particulars On Application to
W. PARKINSON & CO.,
Gas Engineers,
Cottage Lane Works,
CITY ROAD,
LONDON, E.C.



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SPENT LIMES NO LONGER WASTE PRODUCTS!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

MOST EFFECTIVELY AND *ECONOMICALLY RESTORES* LIME WASTES CONTINUOUSLY.

The Patentee having under his several Patents effected a complete solution of the Spent Lime difficulty, most confidently solicits the consideration of the fact by the Engineers and Managers of Gas Companies, Gas Corporations, and other SpentLime producers. The adoption of these Patents secures the following amongst other advantages, viz.:—1st. Nuisance is avoided, and the utmost convenience and comfort in Gas purification are secured. 2nd. The Lime is recovered at from one-third to one-half the cost of new Lime, or from 5s. 6d. to 7s. 6d. per Ton (depending on extent of works and working charges). 3rd. The Lime is either recovered for Building and Agricultural purposes, or specially and continuously for Gas purification—no limit being assigned to its durability. 4th. Nearly the whole of the valuable sulphur is collected and sold. 5th. By the Patentee's Improved Furnace, breeze or inferior cannel coke only is required as a fuel. The process has been worked for a considerable time by several important Gas Companies and Corporations throughout the Kingdom, and with the most satisfactory results. The Patentee erects, proves, and grants working on very moderate terms.

Further particulars may be had on application to A. F. WILSON, Esq., Assoc. M. Inst. C.E., 12, Walbrook, London, E.C., Agent for London; J. E. FISHER, Esq., Stourbridge, Agent for the rest of England, Wales, and Ireland; or to the Patentee—

GEO. R. HISLOP, Engineer, GAS-WORKS, PAISLEY, N.B.

FACE YOUR RETORT MOUTHPIECES.

JOHN RUSCOE calls attention to his Retort Mouthpiece and Lid Facing Machines, which are in extensive use; also to his Lathes, Drilling, Slotting, Grooving, and Planing Machines, Smiths' Hearths, Smithy Fans, Roots' Blowers; also special Screwing Machines for Gas Tubes and Bolts, Taps, Wrenches, Pipe Cutters, special Taper and Twisted Rymers, Drills, &c.

PATENT TWISTED TAPS, DIES, & CUTTERS.

Thousands in constant work, give universal satisfaction.

Work Easier, Less Friction, Last Longer, and do Better Work than straight Grooves.

Main Drilling Stand, with Cup Drills, 1¼ to 6 inch; Taps, Rymers, and Drills.

Ratchet Screwing Stocks, and Adjustable Once-up Stocks, Dies, Guides &c.

Inquiries and Trial Orders Solicited. Everything Guaranteed. Apply to

JOHN RUSCOE, Albion Works, Hyde, near Manchester.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

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THE "CAMPBELL" GAS-ENGINE.

Type of 10-HP. Engine, Nominal. 25-HP. Indicated.

GREAT SUCCESS.

20 PER CENT. CHEAPER THAN ANY OTHER.

Gives the Highest Satisfaction with all kinds of Work.

Testimonial from Mr. JAMES MOON, Engineer to the Filey Gas-Works.

GENTLEMEN,—We have been using one of your Gas-Engines on our Works for abont four months, and I have pleasure in saying that it does its work in a very satisfactory manner. The engine is half-horse power, steady in all its movements, and, with ordinary care, will drive the exhaust apparatus at an even gauge.—I remain, Yours respectfully,

(Signed) JAMES MOON.

For Price Lists and full particulars, apply to the Sole Makers:

THE CAMPBELL GAS-ENGINE CO., LIMITED,

WELL LANE, HALIFAX, YORKS.

SPECIALITIES.

THE "NUGENT" RECUPERATIVE RETORT SETTINGS and FURNACES.

"ROBUS" IMPROVED RETORT SETTINGS, with COKE, TAR, and BREEZE FURNACES.

THE ABOVE SETTINGS & FURNACES ARE PROVING EMINENTLY SATISFACTORY.

Every Particular, with Estimates, forwarded upon Application to

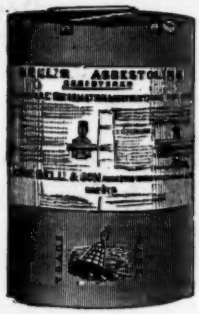
MESSRS. J. & H. ROBUS,

CONTRACTORS FOR THE ERECTION OF GAS & WATER WORKS,

37, WALBROOK, LONDON, E.C.

BELL'S ASBESTOLINE.

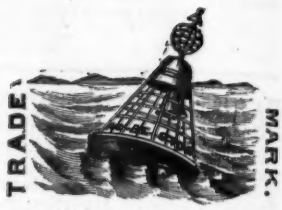
REGISTERED.



All kegs are labelled as above.

ADVANTAGES OF ASBESTOLINE.

ASBESTOLINE is the most efficient Lubricant for all bearings.
ASBESTOLINE is the cheapest Lubricant.
ASBESTOLINE saves from 50 to 90 per cent. of the Cost of Oil.
ASBESTOLINE is the Cheapest Lubricant.
ASBESTOLINE is favoured by Insurance Companies.
ASBESTOLINE is the most Inodorous Lubricant.
ASBESTOLINE is the safest Lubricant from Ignition.
ASBESTOLINE has beaten all other Lubricants in trials.
ASBESTOLINE is applicable in and out doors in every Climate.
ASBESTOLINE requires no special application.



BELL'S ASBESTOS.

CONSISTENCY OF ASBESTOLINE.

ASBESTOLINE, to meet all circumstances, is made in four degrees of consistency—A, B, C, and CC.

ASBESTOLINE, A, is specially adapted to ordinary Land Engines and Machinery, in and out door, in this country.

ASBESTOLINE, B, a little more solid, is for use on Steamships in temperate climates, also on land when it is desirable to have Lubricant stiffer than A.

ASBESTOLINE, C, is for use in tropical climates, both ashore and afloat. It is also invaluable in works in this country when the temperature is high.

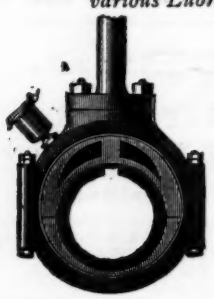
ASBESTOLINE, CC, is designed for use on Calenders, Paper-Machines, &c., where the bearings are heated by steam passing through, and sometimes is advantageously used instead of C.

The reputation of Asbestoline as a Lubricant of the highest efficiency in every kind of Machinery is established; and it has never been equalled by any other Lubricant in the numerous cases of special difficulty in which the best oils are ineffectual. It is used with marked success in Steel and Iron Works, Collieries, Cotton and Wool Mills, and other Textile Manufactories. In Corn-Mills it has proved invaluable on the roller and other modern machines. In Saw-Mills, on machines going up to 6000 revolutions per minute, its work has never been approached by any other Lubricant. On Electric Lighting Machinery, and in Steamships of all sizes throughout the world, the success of Asbestoline is unequalled. Many engines and machines of all descriptions give trouble, and show bad results both in working and wear, when the system of lubrication has not received due consideration. Engineering firms of the highest standing have given to it their powerful testimony and support.

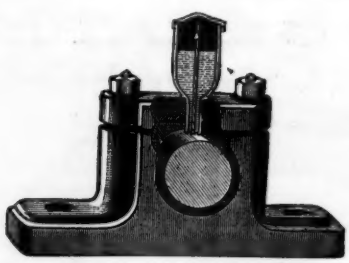
Supplied in Kegs, 28, 56, or 112 lb. Price, 2/3 per lb. Kegs Free. Special Terms for Large Quantities.

IMPORTANT TO EXPORT MERCHANTS.—*One pound of "Asbestoline" equals 2 gallons of Oil weighing 18lbs.; consequently the saving in freight is very considerable. Liberal Terms are conceded to Export Merchants.*

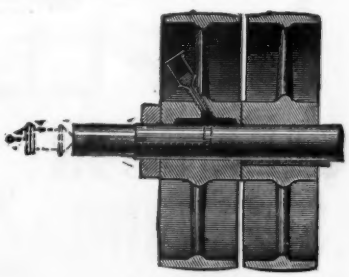
Below will be found illustrations of the mode of fixing Lubricators for Asbestoline to bearings. Full particulars of the various Lubricators supplied for Asbestoline, and the manner of fitting, in catalogue free on application.



Lubricator fitted to Eccentric of Vertical Engine



Showing Section of Lubricator fitted to ordinary Bearings.



Lubricator in different position for Loose Pulleys.

THE ATTENTION OF

ENGINEERS, AND ALL USERS OF STEAM POWER AND MACHINERY,

IS SPECIALLY INVITED TO THE FOLLOWING REPORT.

Owing to the number of Greases now offered, samples of Bell's Asbestoline were submitted to Otto Hehner, Esq., for analysis, and the subjoined Report fully proves Bell's Asbestoline to be the safest as well as the best Lubricant for all purposes:—

The Laboratory, 11, *Billiter Square, E.C., London, May* 3, 1888.

I have subjected a sample of Bell's Asbestoline taken from the stores of Messrs. J. Bell and Son, in Southwark Street, to a number of tests, in order to ascertain whether its use in Mills or Factories might contribute to the danger from Fire.

I found that Asbestoline **ignites only with the greatest difficulty** when brought into contact with flame; that wood and other combustible material soaked in Asbestoline burns, if anything, with greater difficulty than by itself; that its **flashing point** is so high that it **lies beyond the range of Mercurial Thermometers**; and that consequently no friction obtainable in the ordinary run of machinery is capable of developing inflammable vapours from it.

Bell's Asbestoline is **as absolutely safe a Lubricant as can be desired or obtainable.** In the case of fire breaking out from any cause, it does not assist the conflagration; and it is **quite incapable of leading to spontaneous combustion,** either by itself or in contact with inflammable material.

From the physical nature of Asbestoline its use is of necessity perfectly clean and free from waste.

(Signed) OTTO HEHNER, Public Analyst.

Illustrated Priced Catalogue, with numerous Testimonials by Leading Firms, free on application.

BELL'S ASBESTOS COMPANY, LIMITED,

DEPOTS—MANCHESTER: Victoria Buildings, Deansgate. **LIVERPOOL:** 2, Strand Street, James Street.

BELL'S ASBESTOS LUBRICANT.

(REGISTERED.)

All Drums marked as above.

Every Cask is sent out as above.

All Corks are sealed as above.

Any Customer receiving Oil sold as Bell's Asbestos Lubricant, and Cask, Drum or Corks not marked as above, is earnestly requested to forward us sample and particulars of where obtained.

The following Oils, refined and prepared by our Asbestos process, are specially recommended to Users of Machinery of every kind in all parts of the world. We guarantee the quality of each to be unequalled at the price for the purpose named, and a Sample Drum, containing 5 gallons of each or any sort, will be sent on approval to any respectable firm in any part of the world :—

BELL'S SPECIAL GAS-ENGINE OIL.—This oil is guaranteed to stand flame temperature, and is suitable for light Machinery and Shafting where gas power is used.
Price 2s. 9d. per gallon.

1a.—**BELL'S SPECIALLY PURIFIED DARK CYLINDER AND VALVE OIL.**—This oil is guaranteed not to gum, corrode, or in any way injure metal surfaces. It will not carbonize, nor leave any deposit whatever in cylinders or condensers, nor will it injure india-rubber valves. It is absolutely pure hydrocarbon, and will work admirably in all good Sight-feed Lubricators.
Price 3s. 9d. per gallon.

2a.—Bell's Specially Refined and Purified Pale Cylinder and Valve Oil contains the same properties as 1a, and is one of the very best Oils of the Valvoline class in the market.
Price 4s. 6d. per gallon.

BELL'S PALE COMPOUND MACHINERY AND ENGINE OIL FOR EXTERNAL LUBRICATION ONLY.

"3c."—For small and medium-sized Engines, Shafting, and quick-running Machinery, displacing Lard Oil. Price 2s. 6d. per gallon.

"3c. Special."—Heavier bodied than "3c.," and suitable for Locos. and Stationary Engines up to 300-H.P., displacing Olive Oil.
Price 2s. 9d. per gallon.

"3c. Marine."—Much heavier than "3c.;" suitable for Marine Engines and heaviest Stationary Engines, Shafting, &c., displacing Castor Oil. Price 3s. per gallon.

BELL'S AGRICULTURAL MACHINE OIL, for Traction Engines, Road Rollers, and all Machines working out of doors. This Oil will not set on bright parts, is not affected by extreme cold or the rays of the sun. Price 2s. 9d. per gallon.

For other Qualities and Prices, with Testimonials, see Catalogue, free on application.

BELL'S ASBESTOS EXPANSION SHEETING.

The above, which can only be obtained from this house, is recognized as the Most Efficient and Economical Jointing Material in use. It is composed of a specially prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above, and as it is the only Jointing Material which adequately combines PERMANENT ELASTICITY WITH HEAT RESISTANCE, the advantage it possesses will at once be seen.

SECTION OF SHEETING.
PATENT No. 640, 1884.

EXPANSION RINGS.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow expansion and contraction to be fully taken up. The covering, being of Asbestos Cloth, imparts a protection to the centre, and so prolongs its elasticity. For Manhole, Mudhole, Steam-Pipe, and Mash-Tun Door Joints it is unequalled; and if applied as directed, a ring can be used many times over.

BELL'S ASBESTOS.

Price **6s.** per lb. in Sheets. Rings made up to Template, **9s.** per lb.

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

Illustrated Priced Catalogues, with numerous Testimonials from Leading Firms, free on application.

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CARDIFF: West Bute St. BIRMINGHAM: 7, John Bright St. HULL: Humber Dock Basin. GLASGOW: 35, Robertson St.

"THE METEOR."

NEW HIGH-POWER GAS-LAMP, WESTPHAL'S PATENT.
MOST INTENSE WHITE BRILLIANT GAS LIGHT.
MOST ECONOMICAL, SIMPLE, AND DURABLE.
DOES NOT GET OUT OF ORDER.
RIVALS THE ELECTRIC LIGHT.
NO ALTERATION REQUIRED TO EXISTING FITTINGS.
BURNER, BEING A CIRCULAR SLIT, DOES NOT CHOKE UP.

PARTICULARS & PRICES POST FREE.

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SOLE CONSIGNEES FOR GT. BRITAIN & COLONIES,
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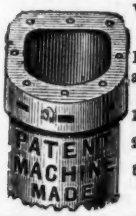
LONDON BRIDGE, E.C.

WILLIAM INGHAM & SONS,



WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

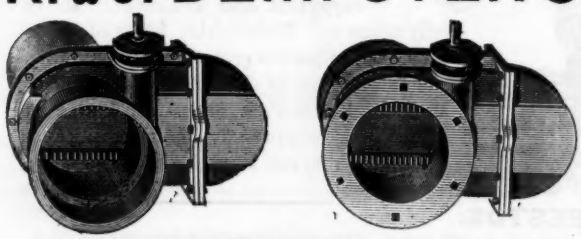
PATENT
MACHINE-MADE GAS-RETORTS.

F. & C. OSLER,
(ESTABLISHED 1807)

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES,
TABLE GLASS OF ALL KINDS,
CHANDELIERS IN BRONZE AND ORMOLU.
MODERATOR LAMPS.

100, OXFORD STREET, LONDON, W.
MANUFACTORY AND SHOW-ROOMS:
BROAD STREET, BIRMINGHAM.

R. & J. DEMPSTER'S



TESTED GAS-VALVES.

The pinions of all our Slide Valves are now cut by special machinery from solid forgings. Valves of 10-in. bore and upwards are fitted with double racks, without extra charge. The flanges are all faced and made to standard dimensions, unless otherwise ordered. All valves are tested and guaranteed tight before leaving the works.

Upwards of 200 Valves kept in stock to facilitate quick delivery.

Prices and Dimension Lists sent on application.

All kinds of Faced and Hydraulic Centre and other Valves made to order.

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JOHN HALL & CO.,
STOURBRIDGE,
MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
RETORTS CAREFULLY PACKED FOR SHIPMENT.
A STOCK OF DIFFERENT SHAPES ON HAND.

SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE
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GODDARD, MASSEY, & WARNER, ENGINEERS,
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OR TO
The Sole Agent,
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ANIMAL CHARCOAL CO., Limited, SHADWELL.
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And to the following Gas Companies and Corporations:—

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HALIFAX.	MARKET HARBRO'.	CHESTER.
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GAS AND WATER PIPES
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CASTINGS OF EVERY DESCRIPTION.

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UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S 'PATENT' GAS MAIN SYPHONS.

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

CLAYTON, SON, & CO.

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GASHOLDERS

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GAS PLANT

OF EVERY DESCRIPTION.

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HUNSLET, LEEDS.

S. PONTIFEX & CO.,

GAS and WATER ENGINEERS,

Manufacturers of and Contractors for the Maintenance of

PUBLIC LAMPS & LANTERNS;

GLASS—Flint, Opal, and Bent in Stock, and Cut to Sizes

WELL LAMPS, STREET NAME TABLETS,

LAMP COLUMNS, HEAD IRONS, PUTTYLESS LAMPS,

LANTERN COCKS, REGULATORS,

Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

BROWN'S PATENT

LAMPLIGHTERS' TORCHES.

PROPRIETORS AND MANUFACTURERS OF

BOX'S PATENT

PUTTYLESS STREET LAMP.

This Lamp may be supplied fitted with clear opal, or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing Lamps to this system can be supplied at moderate prices.

S. PONTIFEX & CO., 22, COLEMAN ST., LONDON.

Works: 18, STEPHEN STREET, TOTTENHAM COURT ROAD, W.

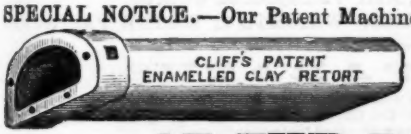
JOSEPH CLIFF AND SONS,

THE ORIGINAL (ESTABLISHED 1795).

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.



AT THE PARIS EXHIBITION, 1878,

THREE MEDALS AND HONOURABLE MENTION

WERE AWARDED TO

JOSEPH CLIFF & SONS,

For their Various Exhibits, amongst which is a

SILVER MEDAL FOR THEIR PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this Class.

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

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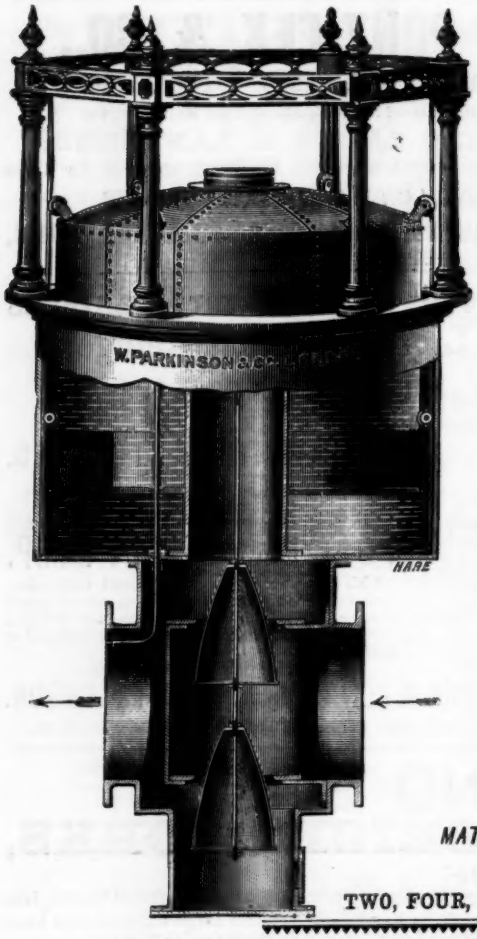

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Telegraphic Address: "INDEX LONDON."

[See also Advt., p. 564.

London Printed by WALTER KING (at the office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 26, 1889.